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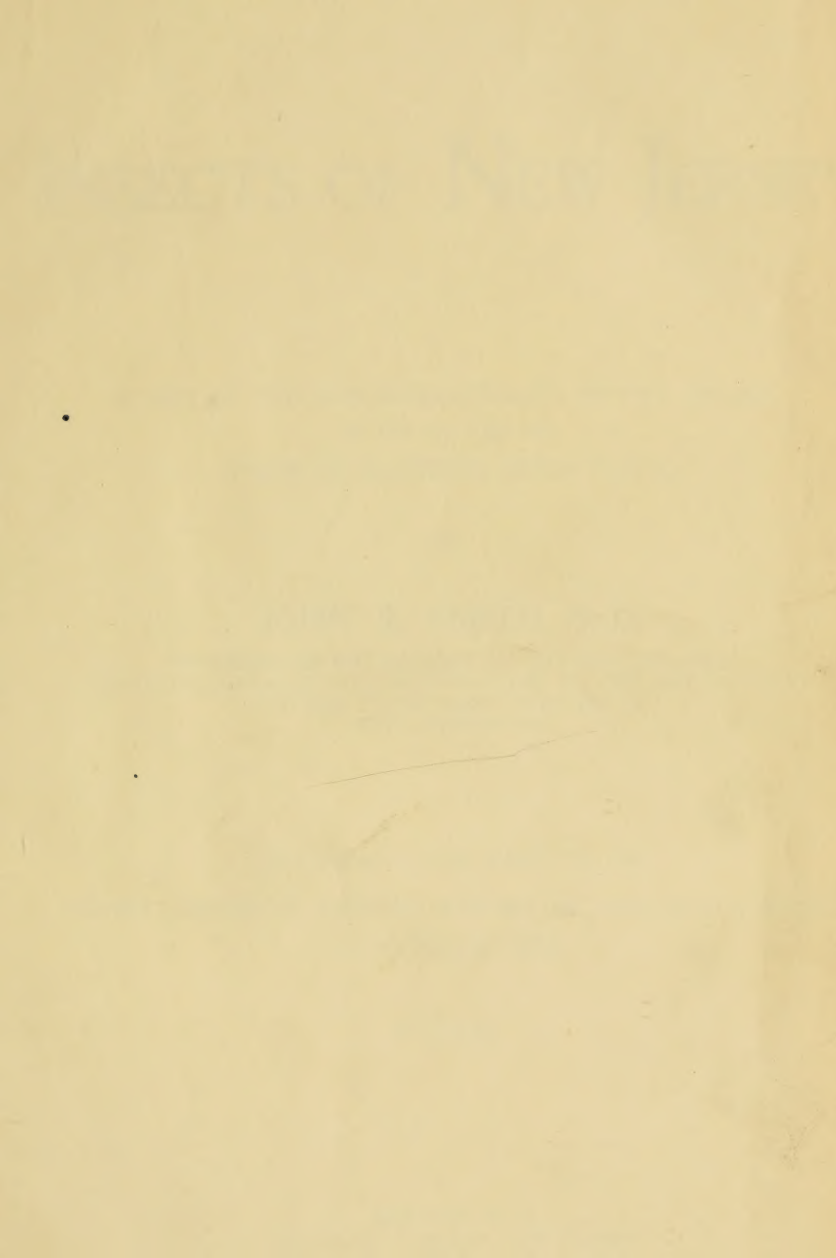
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STATE OF NEW JERSEY.

INSECTS OF NEW JERSEY

A LIST OF THE SPECIES OCCURRING IN NEW JERSEY,
WITH NOTES ON
THOSE OF ECONOMIC IMPORTANCE,

BY

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Prefatory Statement.

The publication of this volume by the State of New Jersey, at this time, marks an era in the progress of the study of entomology, and also shows how extensive the depredations of injurious insects have become. So extensive, indeed, as to require a large annual expenditure of time and money on the part of the farmer to overcome them; and also the necessity there is for study of this subject, not only by those who are or expect to become farmers, but by every one who expects to grow fruit-tree or vine, shade-tree or flower, as no plant or tree is exempt from the ravages of some insect pest.

To make this work of greatest use, the Executive Committee of the State Board of Agriculture have decided to send a copy to every school teacher in the State of New Jersey who applies for it. Such copy to be used by the scholars, under direction of the teacher, for study and reference. The secretary of the various farmers' organizations throughout the State will be supplied with a copy for use by the members, and any family desiring a copy for study will be supplied on request, so long as the edition lasts.

The Executive Committee hereby express their thanks to the State Printing Board for granting their request to print this work, believing that its study will be of much benefit to the fruit and agricultural interests of the State.

Requests for copies should be addressed to

FRANKLIN DYE, *Secretary,*
Trenton, N. J.

TRENTON, March 19th, 1900.

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PART I.—INSECTS AND THEIR CONTROL.

CHAPTER I.

INTRODUCTORY.

At first blush a list of the insects occurring in the State of New Jersey, including therein Staten Island, which belongs to it geographically if not politically, does not seem to have very much economic value. Yet a little consideration will show that from several points of view even a mere enumeration of the species is of importance, and when we consider that insects are unevenly distributed, and that not all species extend throughout the State, it will be readily recognized that some crops may be safely raised in one locality which would be injured in another.

In some parts of our State we have a single brood only of the Codling moth. In others there is at least a partial second brood, and the economic importance of this lies in the fact that whereas one or two sprayings early in the season will protect the farmer where one brood only occurs, it will require midsummer work and much more thorough spring applications to prevent injury to the grower where two broods are normal.

It becomes important also to ascertain in what proportion our friends among the insects are present, and to get as far as possible a fairly complete picture of the actual state of affairs in the insect world, so far as it relates to the farmer.

When we consider the number of species that are enumerated here it will be seen at once that any attempt to give even a brief description or some information concerning the life habits of each would carry the book beyond all reasonable bounds; but this is not really necessary, because, broadly speaking, all the species of the same genus and generally of the same family have very similar life habits. By introducing illustrations, therefore, of the injurious or beneficial types in each group, supplemented by introductory notes to each order, it is hoped that some knowledge can be given that will enable the farmer who will take the trouble to do it, to tell whether he has

a harmless or an injurious insect to deal with. It is also by no means a bad thing to bring to the general attention the vast number of species that occur in so limited a territory, and it affords striking evidence of the importance of information concerning these creatures who do more harm each year than any one other adverse circumstance that the farmer has to contend against. It is a conservative estimate to say that the farm crops in New Jersey are annually reduced 20 % by insect attack, and all of this reduction comes from the farmer's profits.

Some very general directions as to methods of treatment are also interspersed under the headings to which they are most appropriate ; that is, under "Scale Insects" will be found brief directions of the method of dealing with insects of this character, and similarly other injurious groups will be noted. It would carry me altogether too far to write concerning the characters of the insects and how they may be recognized ; nevertheless, some account of their development and the modification that they have undergone in reaching their present state may prove interesting, and a short chapter is devoted to that purpose.

Though it is important that some knowledge of the anatomy and physiology of insects should be possessed in order to understand how insecticides act, this subject cannot be included here, and the curious student who desires to know concerning these matters is referred to my book on "Economic Entomology," in which all these matters will be found set forth in detail. There is, however, a brief chapter on the common insecticides, their range of usefulness, and the methods of application that have approved themselves in practice.

Although New Jersey ranks as a small State in this great country of ours, it nevertheless presents a great diversity in the character of its soils, and in the geologic formation. Ranging from the sandy plains in the southern part of the State through the red shale belt in its center, to the hilly north, we find conditions favorable to a great diversity of plant and insect life ; and, while the actual climatic difference in degrees may not seem very startling, yet it is nevertheless the fact that the red shale belt, which has been already referred to, does separate two rather distinct faunal regions, economically considered.

No very great space need be taken in describing the general surface characteristics of New Jersey. The Geological Survey of the State has done that in the most thorough and acceptable manner possible, and the clearest conception of the matter can be gained by introducing a reduced copy of the relief map prepared in 1896. It has been considered advisable, however, to add a list of the localities

cited that the general character of the surroundings under which the insects occur may be more clearly set out.

Finally, it becomes my very great pleasure to acknowledge the assistance that I have received from entomologists and collectors, not only of our own State, but of the neighboring States of New York and Pennsylvania. The members of the Newark Entomological Society, the American Entomological Society, the Feldman Social and the New York Entomological Society have all placed at my disposal their individual and collective experience, and to all of them I wish to make grateful acknowledgment. Special mention must be made of those gentlemen who have kindly prepared the manuscript in certain of the orders or families from their own experience, supplemented by data that I supplied to them; thus Mr. Wm. H. Ashmead, Assistant Curator of Insects in the United States National Museum, has prepared in its entirety the chapter upon the *Hymenoptera*; Mr. C. W. Johnson, Curator of the Wagner Free Institute, in Philadelphia, has prepared in its entirety the chapter on the *Diptera*. Professor Herbert Osborn, of Columbus, Ohio, has prepared in its entirety the list of *Homoptera*. Professor P. P. Calvert, of the University of Pennsylvania, has prepared the list in the *Odonata*. Dr. Wm. G. Dietz, of Hazleton, has furnished the list of the *Tineina* in the *Lepidoptera*. Professor Lawrence Bruner, of the University of Nebraska, has kindly revised my manuscript in the *Orthoptera* and has determined a great many species. Dr. Harrison G. Dyar, of the United States National Museum, has kindly made suggestions on the general arrangement and classification of the *Lepidoptera*, and while I have not accepted his views in all cases, nevertheless the general system used in this work is that suggested by him. In the *Coleoptera*, Mr. H. W. Wenzel, of Philadelphia, has been of the greatest possible assistance, and it needs only a glance over the list to see how much it is indebted in that order to the tireless work done by him on the insect fauna of our State. It would be a pleasure to me to mention here individually all those who have been so kind as to aid in the preparation of this work, which is far beyond the compass of any one individual, so far as the accumulation of facts is concerned; but as this is not convenient, special acknowledgments are made under the separate orders or in the explanation of abbreviations used.

It has been aimed to make the list as complete as possible, and to give only actual records; but it has not been found practical to carry out this ideal in all respects. Collections in some of the orders are still so fragmentary that a mere list of what has been actually taken

would give no sort of conception of the actual fauna. In such cases species that are known to occur in the general faunal region to which New Jersey belongs have been included, and as a rule the distribution of such insects, as recorded in the books, has been given.

Very great care has been exercised in getting accurate determinations in all orders, and doubtful records in the previous edition have been verified so far as possible ; but it is probable that some errors yet remain and others may have crept in anew.

Concerning the sequence of species in the orders, that is not quite as variable as in the previous list, most of them being now catalogued from the highest to the lowest ; but in some instances the last word on the subject is yet a long way off.

I have credited almost every record received, and all not so credited should be charged to me. The collections made for the college and experiment station at New Brunswick are now very fair, and many localities credited to others could have been supplied from them ; but I have preferred throughout to add on my own authority only such data as was additional or supplementary to that furnished by others. All the economic notes and suggestions are my own.

Finally it is hoped that a very much more useful work than that prepared in 1889 at the request of the late Dr. George H. Cook has been produced.

CHAPTER II.

DEVELOPMENT OF INSECTS.

Insect life was among the earliest that appeared on the earth. Just when it did appear, or what it was like at first, we cannot say definitely, because soft-bodied creatures without bones or chitinous external skeleton are not readily preserved in the rock, or, when present, are easily overlooked if not absolutely irrecognizable. We are therefore driven to more or less theoretical conclusions, based upon what has been found in the rocks and upon what still exists with us.

We find reason to believe then that the primitive insect from which the vast variety now existing has been developed was a small, soft-bodied creature, living in mud or in moist earth along the banks of bodies of water. It had six legs, no wings, probably abdominal appendages other than legs, no compound eyes or no eyes at all, and no developed breathing system; taking in oxygen from the surrounding moisture through all parts of the skin surface. The head was not much differentiated from the rest of the body and the mouth parts were generalized, *i. e.*, neither typically fitted for biting nor for piercing, though three or four pairs of fleshy processes contained the possibilities of both types. Creatures very much like that just described exist at the present time and form part of the order *Thysanura*. In some of the forms of that order now existing mandibles occur, and in others they are, if present at all, in the form of straight processes, unfitted for chewing. These insects have no metamorphosis and usually live in damp places, feeding on decaying substances.

Our primitive Thysanurans developed first of all into two branches according to mouth structure—some becoming fitted for chewing their food, while others became fitted to puncture and suck. In both of these branches wings developed, quite different in type, yet with a similar scheme in venation; Cicada, according to Comstock, representing a most generalized condition.

The little order *Thysanoptera* has the mouth fitted for puncturing or scraping the leaf surface, getting at the plant juices in that way, while the wings are long, narrow, frail and with long fringes, from which the ordinal name is derived. They are unfavorably known to the farmers as *Thrips*, and they often do serious injury to field crops like onions and cabbage, and to nursery peach trees.

A step forward is made in the *Rhyngota*, in which the mouth parts are developed into slender lancets fitted for piercing and protected by

a beak. These creatures are able to puncture plant and other tissue and to suck the juices, vegetable or animal, as the case may be. The *Parasitica* contains those forms without wings, adapted to live among the hair on the blood of certain vertebrates, and here the beak is not developed or is lost, the piercing lancets being retractile into the head.

The order *Homoptera*, another of the divisions of the *Rhyngota*, contains the plant lice, scale insects, leaf hoppers and mealy bugs, hence is, in its entirety, injurious to the agriculturist. The wings when they are present are always of similar texture throughout, though the two pairs may not be alike.

The *Hemiptera* have the upper pair of wings thickened at the base and thin or membranous at the tip, and this gives them the name half-winged. They are the true "bugs" of the entomologist and contain such forms as the "chinch bug," "squash bug," "bed bug." The great majority of all these bugs are injurious to plant life, though in some groups a predatory habit has developed.

None of the *Rhyngota* have a true metamorphosis or transformation, though the males of the scale insects make an approach to it. The little bug just out of the egg resembles its parents in all save size, absence of wings and lack of sexual development.

Taking it all in all the sucking branch of the insects is small compared to that in which mandibles were developed, for the possession of jaws or biting structures opened up a much greater range of food-getting possibilities.

With the development of wings the thoracic segments which bear the organs of locomotion became modified. At first all the segments were similar to each other, and one series retained this peculiarity, all the rings being of practically equal importance. These are all loose-jointed frail forms, with large transparent wings.

A departure was made when the second and third segments which bear the wings became united together for more compact muscular attachments and the first segment or prothorax was left free.

The highest specialization was reached when all three of the thoracic segments united to form a compact body supporting all the organs of locomotion.

These different modifications once started tended to become intensified, and there is little difficulty now in recognizing the orders belonging to each series.

Perhaps the simplest type in general structure are the *Isoptera*, including what are generally known as white ants. These creatures are soft-bodied, loose-jointed, all the thoracic rings well developed,

and altogether primitive in appearance. The wings are large and frail, net-veined, not united in flight and not folded when at rest. Yet while in general structure these insects are of the simplest, they have become very highly specialized socially, living in immense communities and developed into special castes like workers, soldiers and fully developed sexed individuals. The workers have no eyes, but have interesting and peculiar sensory structures that serve them as well in their underground life. Only one species occurs in New Jersey, and that is not injurious to growing crops.

The *Mallophaga* are the biting lice, and they have the same general form as in the white ant workers, though more flattened and in general adapted to their parasitic mode of life. They occur most abundantly on birds, including the domesticated varieties, but are also found on cattle and horses. Wings are never developed in this order, and, as in the *Isoptera*, the transformations are incomplete.

The *Corrodentia* mark a step in advance, but are still soft-bodied and loose-jointed. The book lice are a common type found in houses and resemble the biting lice in form; but they are very active and run rapidly. Some forms develop wings, and those, though broad and very peculiarly net-veined, are not folded when at rest.

The *Neuroptera* or insects with net-veined wings mark a distinct advance. The larvæ yet retain the general form of the worker white ant, but the body is much broader and the jaws are better developed, for most of the species are predatory. These larvæ are known as Ant lions and Aphis lions because of their habit of feeding on these insects; but they attack also a great variety of other species and are highly beneficial. The larvæ when full grown form a true pupa, which remains quiescent until the winged adult emerges and the transformation is thus complete. These adults have generally slender, long bodies, with very large wings which are laid flat when at rest and not folded. The lace-winged flies are common examples of this order and they may be stirred up in rank vegetation anywhere in summer. Their green color, very delicate lace-like wings and foul odor will identify them readily. As a whole this order is very near to the series with compact thorax in which a distinct neck is developed.

It will be noted that all the orders referable to this first series with similarly developed thoracic segments are terrestrial in all stages, and none of them live in or under water.

The second series of the mandibulates is that in which the first segment of the thorax became separated from and moveable upon the second, while the second and third became closely united. In all

cases the head is set into this first segment and there is never a distinct neck between them.

This series branched early in two main divisions, one of them adapted to living on land, the other living in or under water.

The *Plecoptera* or plaited winged forms, known as stone flies, have the wings net-veined, and the hind wings are folded or plaited beneath the fore wings when they are at rest. The larvæ live under stones in water, breathing by means of gill tufts, and they are not in any way important to the agriculturist. Their transformations are incomplete.

A step forward is made in the *Platyptera*, where the transformations become complete. In general appearance these are not unlike the stone-flies, but are larger and more stoutly built. The wings are folded in much the same way and the insects are known as "fish-flies," some of them of very large size and formidable appearance. The larvæ live on the bottom of streams and under stones, breathing through gill tufts. One of the largest is known as the "dobson" or "hellgrammite." Neither of these forms is of the least importance to the farmer unless he is also a fisherman: then he is interested to know that the "hellgrammite" is ideal bait for black bass.

In the terrestrial division the roaches became first developed and from them the other members of the order *Orthoptera* or straight-winged insects. These include besides roaches, the grasshoppers, katydids and crickets, hence are of great importance to the agriculturist. All these *Orthoptera* have the fore-wings narrow, unfitted for flight and serving chiefly as covers for the large secondaries which are folded fan-like beneath them. The transformations are incomplete.

Some of the earlier roaches had, and indeed some of those yet living have, the hind wings folded transversely, and from this type we derive the *Dermoptera* and *Coleoptera*.

The *Dermoptera* or earwigs are scarce in our State, though they are injurious in some European countries; but they resemble small, short-winged beetles, with a curious forceps-like anal appendage which they use in tucking their large hind wings under the short wing-covers. To enable them to do this the hind wing is hinged at the middle of the front margin and around this hinge the plaits radiate so that the whole can be tucked into a little packet.

The *Coleoptera* or sheath-winged insects, commonly called beetles, are of the utmost importance to the farmer. They have the fore wings hardened so as to be useless for purposes of flight, and they are laid on the back so that the inner edges meet in a straight line down

the middle. The omnipresent potato beetle may serve as an example of this order, and also as an indication that the larval as well as adult stages of the Coleoptera may be and usually are injurious. The transformation is complete.

The third and last of the mandibulate series is that in which all the thoracic rings are joined together, the first segment or prothorax becoming much reduced in size. The head is now free from the thorax and united to it only by a slender neck. A fly, a bee or a butterfly will at once show what this neck is like, if only casually examined.

The ancestry of this series began in aquatic forms passing the larval stages under water, and the *Ephemerida* or day flies are probably the earliest of the types. These insects pass their larval life under water in the mud, in immense numbers, and when full-grown change to a frail, gossamer-winged creature that is called a day fly because of its very brief or ephemeral life. It appears in the early evening, seeks a mate, deposits its eggs if a female, and dies before morning. Most of the species have slender anal filaments, and when at rest hold the wings upright like butterflies. The metamorphosis is incomplete and the insects are of no importance to the farmer.

The *Odonata* or dragon flies are also aquatic in the larval stage, and in their day were very numerous and well developed. Among our fossil species are some in which the wings expanded from 15 to 18 inches or even more, and there was at that time a reason why primitive man should fear the "devil's darning-needles." They have two pairs of similar wings which are net-veined and they are predatory in habit. The larvæ live in the mud in ponds and among water plants, feeding upon any soft-bodied creature that comes in their way. The transformations are incomplete and the order is a peculiar one, forming the end of a line which has no descendants.

The *Ephemerida*, however, did develop in two ways—one to a caterpillar-like larva living in mud and moist places generally, the other toward a caterpillar-like larva living in the water and building a tube or case for protection. The latter are the *Trichoptera* or "caddice flies," the wings of the adults covered with hair, the hinder pair folded under the anterior. The larvæ are predatory in some cases, vegetarians in others; but in neither instance important to the agriculturist. Their cases are made of sticks, stones or other fragments and some of them are beautifully done, resembling shells so closely as to deceive even collectors at first sight. The adults usually fly at night, are attracted to light and have very long, slender antennæ.

Direct descendants from the *Trichoptera* are the *Lepidoptera* or scale-winged insects including the butterflies and moths. Many of the caterpillars of the lower forms of the moths still are aquatic and live in cases, while many others that no longer live in the water yet make cases, the common clothes moth larva being an easily secured example. The *Lepidoptera* have the transformations complete, the larvæ, known as caterpillars, being vegetable feeders with few exceptions, while the adults, butterflies or moths are harmless, the mandibles becoming rudimentary and the maxilla formed into a long coiled tube for sucking liquids. By this coiled tongue and the scaly wings the *Lepidoptera* can be easily recognized at all times.

The mud or earth living larvæ developed at once into terrestrial types and the oldest and most generalized of these are the *Mecoptera* or scorpion flies. They derive their common name from the fact that in the males many of them are furnished with a prominent anal forceps curved upward like the tail of a scorpion, though it is entirely harmless. The wings are long and rather narrow, net-veined and not folded. They are peculiar in having the mouth parts prolonged into a beak-like structure in which the parts are very much divided, and their habits are predatory.

There is no very obvious connection between the remaining orders and any of the others, their descent from the *Mecoptera* type being incapable of demonstration from living forms so far as known to me.

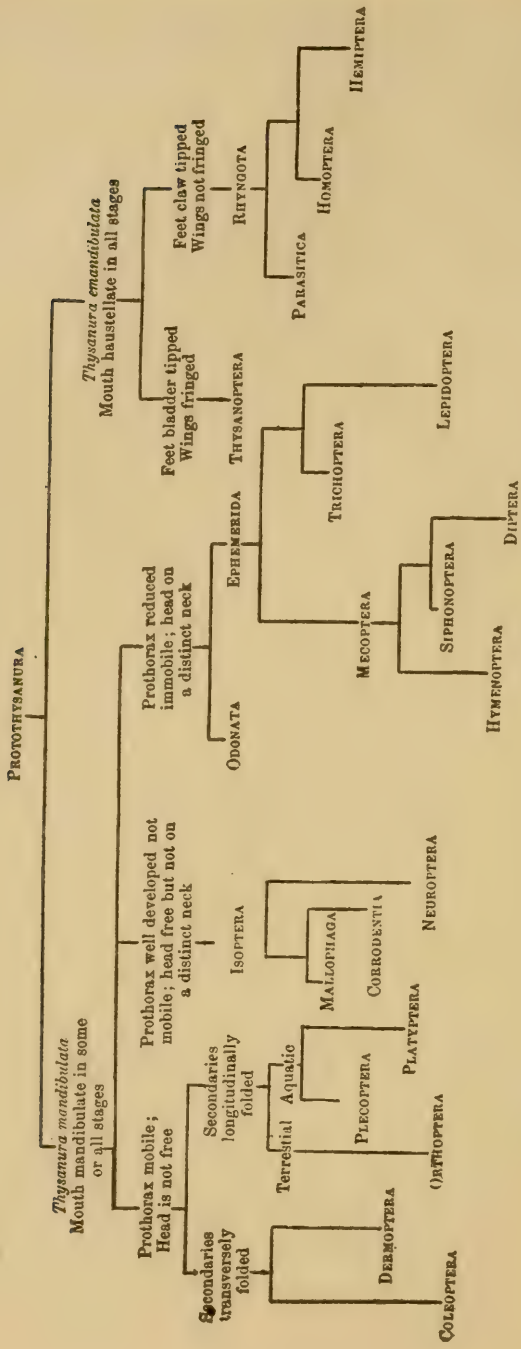
The *Hymenoptera* contain the bees, wasps, ants, saw flies, ichneumon flies and the like and, among them we find the very highest types of social organization and the extreme of intellectual development among insects. The mouth parts are in many cases elongated to enable the insects to gather the nectar of flowers, and they have four transparent wings with comparatively few veins. The transformation is complete, and in many instances the larva is dependent for its food upon the supply gathered by the parent. Most of them are beneficial; but there are some injurious groups, *e. g.*, the saw flies.

The *Diptera*, or flies, can be always recognized by having two wings only, the hinder pair having become rudimentary, serving at present as poisers or balancers instead of organs of flight. Their larvæ are mostly grub-like or maggots, and, while there is no development of social or intellectual characters, the flies are in their transformations and physical structure at the head of the insect world. They contain both injurious and beneficial species, and their mouth parts are adapted for either lapping, as in the common house fly, or for piercing and sucking, as in the equally common mosquito.

An offshoot from the order *Diptera*, which has become partly parasitic, we find in the fleas, for which the ordinal term *Siphonoptera* is used. They are wingless, laterally compressed, and live as adults on warm blooded, hair or fur coated animals.

In a graphic form the scheme of classification and development is shown on the accompanying diagram. (See page 14.)

For convenience in cataloguing, the sequence of the orders is modified so that all the Neuropterous forms are grouped together, irrespective of the series to which they belong in point of development.



CHAPTER III.

INJURY CAUSED BY INSECTS.

The fact that farm crops are annually shortened to a considerable extent by insect attack is common knowledge ; the percentage of injury has been variously estimated from 10 % to 50 %, and both are accurate and yet incorrect, for injury varies in the same locality and on the same crop from year to year. As an example, the pea crop in 1899 was in many sections of our State cut from 10 % to 30 % by a plant louse which had never before done any appreciable injury and had not been even described ; it is not probable that without a duplication of the weather conditions existing in the spring of that year, a similar percentage of injury will occur for a long time to come. In some seasons the melon plant louse destroys the crop completely over large areas, while in others there is little injury noticeable. Thus the percentage varies with the years and with the species ; but there are no years when some crop does not suffer heavily, and some species, like the codling moth and plum Curculio, exact toll annually ; so we will be easily within bounds if we estimate the annual shortening of farm crops in our State as ranging from 20 % to 25 %. It is also important to note that this injury is more severe than the figures would indicate, since the shortage is largely the *profit*. The cost of planting, fertilizing, cultivating, and often of harvesting, is the same ; what is gone is the 20 % or 25 % that would have been almost clear profit had it been there.

Insect injury may be either to quantity or to quality of the crop, and the importance of the latter is not sufficiently understood. A basket of wormy apples costs to put into market exactly as much as a basket of first-class fruit ; yet the difference in price in a full market often equals 50 % and sometimes even more. Corn that is gnawed by caterpillars or cantaloupes undersized and sooty from plant-louse attack are left unsold until nothing better is attainable, or is purchased only because the price is much below what better products are bringing. Sightliness goes a long way with the average buyer, and quality is often secondary if a product is perfect in form. I have emphasized this point, because it is one in which the greatest improvement can be effected and in which the percentage of loss can be much decreased.

Insect injury to quantity is much the most obvious and is the one most usually complained of by the farmer. A striking example of

this kind of loss I saw recently in a plum orchard of about 200 trees which had been in bearing condition for six or seven years. Each year the trees blossomed well, set their fruit well, and in July dropped every plum, filled with *Curculio* larvæ! In five years not five bushels of fruit were harvested from all the trees! This is an extreme case; but similar ones are not rare, and the fruit grower does not suffer alone. In 1898 and 1899 more than one grain farmer failed to get even his seed back from his wheat fields, because of injury done by the Hessian fly.

All parts of a plant are subject to insect attack. Caterpillars, slugs and grubs, beetles, bugs and lice attack and devour the leaves or suck the plant juices. Borers infest the twigs, branches, trunks or stems of tree and vegetable, and numerous types live in the soil on or near the roots—like white grubs and wire-worms. Mandibulate or biting insects devour the plant tissue, while haustellate or sucking forms drain the juices which nourished it. The distinction is important, for the means adapted to destroy the one type are sometimes useless as against the other: Thus paris green applied on potato leaves kills the beetle and its larvæ when they feed on them; but it has not the slightest effect upon the plant lice that suck only the juices. Therefore we must adapt our remedial measures to the case especially in hand, and our first inquiry must always be just how, just when and just where does the insect do its injury. When these questions are satisfactorily answered we can more intelligently consider the best methods of preventing or checking further ravages. Sometimes a modification of the ordinary farm practice will suffice to secure exemption from further attack, while if insecticides must be resorted to, the point or stage at which to strike is a matter of great importance.

On ordinary farm crops annually put in, the insect injury is usually all crowded into the compass of a single year: *i. e.*, the melon crop is lessened from 50 % to 100 % over a given district, and this loss is the measure of damage. There is nothing that prevents putting in a similar crop the year following and no certainty that any such disaster will again overtake it, even if no measures in avoidance be taken.

In orchards injury may be and often is progressive, as when bearing trees are attacked by borers which first lessen the crop and eventually destroy the tree. Here the measure of damage is the value of the bearing tree for the period which is required to bring another into similar condition, and the injury extends over a period of years.

Briefly, then, all farm and orchard crops are subject to insect attack

and consequent injury. All parts of a plant or tree may be attacked, and either the tissue destroyed or the juices drained. The damage done may be either by destroying the plant or lessening the value of the product. The function of the economic entomologist is to indicate to the agriculturist the method of checking or altogether preventing this damage, or of reducing it as much as possible. In the following list some idea is given of the number and character of the species, injurious as well as beneficial, and of the other host that is of no economic importance though filling its place in nature's plan of constant change of matter from inorganic to organic and from vegetable to animal; only to return eventually to the inorganic compounds in condition to start anew on the cycle of change.

CHAPTER IV.

INSECTICIDES AND THEIR RANGE.

Nothing so forcibly demonstrates the importance of checking or reducing insect injury, as the number of patented or proprietary insecticides that have been of late years put upon the market, and the great variety of machinery for its application that has been devised and is being constantly manufactured.

Insecticides are of two general types—those that kill by being eaten or stomach poisons, and those that kill by corroding the tissue or clogging the spiracles or breathing pores, *i. e.*, contact poisons. The distinction is an important one, for while contact poisons may kill insects of any kind, stomach poisons kill only such as eat the tissue upon which the poison is spread. Thus the apple tree caterpillar may be readily killed by an arsenical spray which poisons its food, while the plant lice clustering on the same shoot will be entirely unaffected.

Arsenic in one or the other of its combinations is the chief stomach poison, and paris green is the form in which it is most commonly used. Paris green is, strictly speaking, an aceto arsenite of copper, manufactured as a coloring material and not primarily for insecticide purposes. When pure and well made it contains from 50 % to 60 % of arsenious acid combined in such a way as to be practically insoluble in cold water. Arsenious acid soluble in water is as destructive to plant as to animal tissue and will "burn" foliage at a strength necessary to kill the insects feeding upon it. Combined with copper or lime it is insoluble in water and therefore harmless to plant life, though yet soluble in the digestive juices of insects and therefore fatal to them. It is slightly soluble in warm water, hence, when sprayed liberally on a plant in the hot sunshine, the water becoming heated before evaporation dissolves some of the acid and causes a burning effect. Applications are best made, therefore, in the morning or evening, or on a cool day.

When applied dry it may be either dusted very finely on the plant surface to be protected, or it may be mixed with lime, plaster, flour or other material and applied more freely, yet not in such intimate contact with the plant. Good paris green, well made, may be safely applied pure or unmixed on a dry foliage or one moist with cold water, provided it is spread in an even, thin layer. Indeed, this is really the most effective way it can be employed on low plants.

When mixed with air-slaked lime or plaster, one part in fifty is a good proportion, and it may then be very freely used.

Spraying means the application of a watery mixture in very fine particles, by means of a pump, through a nozzle adapted to secure this fine division of the liquid under pressure.

Paris green is or should be insoluble in water, hence we can get at best only a *suspension* of its particles in water. When this mixture is sprayed on a plant the water evaporates and leaves a film of dry green on the surface which is evenly spread in proportion to the care with which the application was made, and dense in proportion to the amount of poison contained in the mixture. The plant is thus really coated with *dry* paris green and the water is used merely to facilitate its even distribution. A very usual proportion is one pound of Paris green in 150 gallons of water, and this, if thoroughly applied, kills most of the leaf-feeding insects in their early stages and a large proportion of them in all stages. If a stronger mixture is used, unslaked lime, equal in weight to the paris green, should be added and lime and green slaked together in a small quantity of water to combine the free or soluble arsenious acid.

As usually prepared, paris green is crystallized for use as a pigment and, the particles being relatively large and heavy they sink rapidly to the bottom in a watery mixture, which necessitates a constant stirring to keep it in suspension, and makes its even application a matter of some difficulty, with ordinary farm labor.

The crystallized form, though necessary in the pigment is a positive disadvantage in the insecticide, as well as an addition to the cost of manufacture, hence there has been recently placed upon the market an arsenite of copper or "Green Arsenoid," which, at a cost of 15 cts. per lb., is more effective and reliable than the ordinary run of paris green. It contains about 62 % of arsenious acid and is manufactured by the Adler Color and Chemical Works, 100 William street, New York. This material has the unqualified endorsement of those entomologists who have experimented with it, and its advantages are its more uniform strength, finer division and much lighter particles, so that it remains in suspension much more easily than normal paris green. It is said to be entirely harmless to foliage. This company make also a pink arsenoid and a white arsenoid which are cheaper, but concerning which I know too little to recommend their use.

White arsenic is probably the cheapest form of the poison, but also the most dangerous to plant life. It has been used, combined with two or three times its own weight in lime to form an insoluble arsenite of lime, in from 250 to 400 gallons of water, and it has been

used in combination with soda ; but the latter mixture must be prepared by boiling, and I doubt whether it would not cost in ordinary hands more than the saving in first cost of materials over the green arsenoid. I have not had personal experience with these substances sufficient to recommend their use.

Arsenate of lead is in a different case and this has proved in my experience to be much preferable to paris green, because of the ease with which it remains in suspension and its absolute harmlessness to foliage at any strength. The material is prepared by dissolving arsenate of soda and acetate of lead in separate vessels and then combining the solutions.

The formula is :

| | |
|--|------------|
| Arsenate of Soda, | 4 ounces. |
| Acetate of lead (sugar of lead), | 11 ounces. |

Dissolve both substances in separate vessels, using sufficient water to take it all up, no definite amount being essential. Then combine the two in a large tank and add water to make from 80 to 100 gallons, stirring thoroughly. At 80 gallons the mixture corresponds to paris green 1 pound in 125 gallons, and this is sufficient for all but the more resistant forms, which require all arsenites in much stronger mixtures. A great advantage in using this compound is that it is always uniform in strength, and when once the farmer has found just what proportion is most successful for his especial purpose, he can rely upon a similar effect, so long as he is careful to make up his materials in the same way. Another feature is its harmlessness to any foliage at any strength ; hence plants like sweet potatoes may be dipped in it before being set out, and thus protected against attacks of the sweet-potato flea, or the "golden beetles" or "peddlers," which often do much injury before the plants get a fair start.

Arsenate of lead in dry form has been prepared and advertised ; but the product is not satisfactory, and in that condition has lost one of its most valuable features, *i. e.*, easy suspension in water ; it is, indeed, very heavy and precipitates much more rapidly than paris green. A paste form of arsenate of lead is made by Wm. H. Swift & Co., Boston, Mass., and this has the endorsement of Mr. A. H. Kirkland, of the Gypsy Moth Committee in Massachusetts. H. L. Frost & Co., 21 South Market street, Boston, Mass., sell the separate chemicals at a reasonable rate. No doubt any large dealer in such products in New York or Philadelphia would make satisfactory prices ; but drug-store prices in small towns or villages would be prohibitive. I strongly recommend farmers to become familiar with this material.

London purple is a waste product much used at one time and with advantage in many cases ; but it was never very favorably considered by farmers generally because of its variability and its tendency to burn foliage : hence it need not be further considered here. The green arsenoid has all its advantages and none of its bad features.

Another form of using the arsenical poisons may be conveniently mentioned here, *i. e.*, dry and mixed with bran. Wheat bran seems to be peculiarly attractive to caterpillars, especially cut-worms, who will eat it in preference to their usual green food, and this weakness we may take advantage of to their undoing. Mix paris green, white arsenic or green arsenoid, 1 pound, with bran 50 lbs., making the mixture as complete as possible so that each particle of bran may carry its particle of poison. Against cabbage worms, especially the loopers, sprinkle over the forming head liberally the dry mixture. Against cut-worms a spoonful at the base of each hill to be protected will be effective. In my experience it is better to moisten the bran by adding water enough to make a mush, using also a little molasses to make it somewhat sticky and causing it to remain moist the longer, when cut-worms are to be killed. There is then no danger of the material blowing away or becoming covered with sand, while the sweet stuff seems to make it either more attractive or more easily discovered.

When an arsenical spray is to be used on a very smooth leaf, or one that, like cabbage, sheds a watery mixture, the addition of 1 pound of soap to every 40 or 50 gallons of water will be an advantage, while it will do no harm in any case. Once thoroughly applied, arsenic remains on the foliage a long time. It settles into the pores of the leaf, and, as it is not soluble, remains there for weeks. It is this fact that sometimes causes a premature ripening or dropping of the leaves of sprayed trees, and this also makes the arsenate of lead so lasting in its effects, because the very fine particles settle everywhere, while they do not so seriously interfere with the functions of the leaf as do the larger crystals of paris green.

The bordeaux mixture is not, strictly speaking, an insecticide; yet few insects care to eat foliage covered with it, hence it serves as a repellent.

The formula is as follows :

| | |
|-------------------------------|-------------|
| Sulphate of copper, | 6 pounds. |
| Quick lime, | 4 pounds. |
| Water, | 22 gallons. |

Dissolve the copper sulphate in 1 gallon of hot water, and in another vessel slake the lime with a gallon of water; add the milk of

lime slowly to the copper solution, stirring constantly, and strain through a sieve or coarse gunny-sack ; finally, add 20 gallons of water and the mixture is ready for use. This gives the standard, full-strength mixture, which can be reduced by the addition of water to any desired point.

Paris green, green arsenoid or white arsenic may be added to this bordeaux mixture where a combined insecticide and fungicide is desired, and for insecticide purposes the fungicide may be counted as so much water in determining the amount of poison to be added. The excess of lime in the bordeaux mixture as prepared above is sufficient to neutralize the free arsenious acid in the insecticides. It is said that the arsenate of lead may also be used with the bordeaux mixture, but with this I have no personal experience and do not advise it. The green arsenoid is the best material for the purpose from its composition.

No other fungicide preparation adapts itself to a safe mixture with the arsenical insecticides and no other combinations are recommended.

Tobacco and hellebore have some value as stomach poisons, yet their best effect is obtained by bringing them into actual contact with the insects.

Hellebore has a very limited range and is mainly useful against the larvæ of saw-flies, like the currant worm, and against such it is almost a specific. It may be applied dry, as a powder or in the form of a decoction, using one or two ounces in one gallon of water, according to the age of the insects operated against.

Tobacco has a much wider range of usefulness and is really a very important insecticide, though somewhat expensive. It may be applied dry, as a very fine powder, or in the form of a decoction. The tobacco powder is often a useful repellant applied at the base of trees or plants to avoid injury from root maggots or borers, and dug into the soil about a tree infested with root lice it is doubly useful in destroying the insects and acting as a fertilizer.

Tobacco stems about the base of trees are absolutely useless and a detriment rather than otherwise. The killing agent is nicotine, and the tobacco must be in such state that a good rain will dissolve this all out and bring it into contact with underground pests—otherwise no advantage will be derived.

If used dry against plant lice it must be very finely ground to penetrate into the spiracles ; otherwise it is no more than so much coarse sawdust.

Its range as a decoction is much greater and extends to all plant lice, to thrips, mealy bugs, young leaf hoppers and some other soft-

bodied sucking insects. It has also been used against certain caterpillars and leaf beetles, but against these the arsenites are usually better. A useful decoction is 1 lb. of tobacco refuse, chopped stems, &c., to 1 gallon of water, boiled until a deep brown extract is obtained. This may be used full strength or may be more or less diluted according to the resisting power of the insects. Several prepared decoctions or extracts are on the market and at least two of these, *i. e.*, Hammond's tobacco preparation, and the Rose leaf extract are satisfactory in their effects. The Rose leaf extract is used quite extensively in greenhouses, and, so far as I have learned, always with good effect. In greenhouses the extract is evaporated on the hot pipes and a slow fumigation is thus maintained. Details are out of place here, but in general tobacco is useful chiefly against plant lice and certain other forms of sucking insects as a contact poison.

Pyrethrum, or Persian or Dalmatian powder, is too expensive for field use, its range of action being fully covered by cheaper substances; but in the house and small conservatory it is the cleanest and most satisfactory material against plant lice, mealy bugs and similar pests. Make into a decoction, or steep 1 ounce in 1 quart of hot water; when cold add a quart of cold water, using as a spray, from an atomizer or the like. It is entirely harmless to plant life, but peculiarly fatal to insects.

Crude petroleum has of late been found to be especially effective against armored scales hibernating as partly grown larvæ, while entirely harmless to dormant trees. It cannot be used in summer because of its choking action among the leaves, but it may be used on the bark alone at any time, and in winter the dormant tree may be safely painted from crown to the surface without harm to either the tree or the resulting crop.

It can be used with an emulsion sprayer, like kerosene, and may be used at any time, provided only the trees are dry.

Kerosene, one of the distillates from crude petroleum, is much more dangerous to plant life, yet has a much greater range of usefulness, because it may be used in summer. Pure kerosene is fatal to all insects not especially adapted to live in it, and, from its penetrating character, it is more effective in reaching scale insects than any other, save only the crude oil. Applied in winter on dormant trees, it evaporates rapidly under favorable conditions, and injures nothing; but the margin of safety on peach and plum is small, and the former especially are easily injured by it. In summer it may be applied undiluted in a fine spray, on a bright day favoring rapid evaporation, on all except peach trees. In each case the insects are killed at practi-

cally the instant they become covered or wet, and the sooner the oil gets off thereafter the better it will be for the tree.

The application of pure kerosene is not advised however at present, because the crude oil is safer and more effective in winter, and a diluted mixture is just as effective in summer.

Kerosene may be diluted with water either by first emulsifying with soap-suds or by applying with an emulsion sprayer in a mechanical mixture.

The emulsion may be made as follows :

| | |
|--|------------|
| Hard soap shaved fine (Ivory is best), | ½ pound. |
| Water, | 1 gallon. |
| Kerosene, | 2 gallons. |

Dissolve the soap in boiling water, warm the kerosene and add the boiling hot suds to it; then churn with a force-pump for a few minutes, and we get, first, a milky appearance which yields rapidly to a cream, and then to a soft butter-like mass that cannot be pumped.

When cold this will adhere to glass without oiliness, and the emulsion thus made, containing 66% of kerosene, may be diluted with water to any desired extent. The water should be soft, or should be made so with borax, and the mixture must be hot to combine to the best advantage. At the rate of 1 part of emulsion to 10 parts of water this emulsion is fatal to most insect life except scales, and safe on all save peach trees. The presence of the soap, checking the rapid evaporation of the oil, makes this proportionately more dangerous than even pure oil and much more harmful than mechanical mixtures at greater strength.

The mechanical mixture is put on by means of a pump or pumps adjusted to draw from separate tanks of kerosene and water at one time, in varying proportions. It is by far the best method of using the kerosene, and a mixture containing 10% of kerosene is safe on foliage of any kind in reasonable application, while it is fatal to all insect life except scales.

There are other ways of using the oil—with pyrethrum, or emulsified with soft soap; but practically one or the other methods above described will prove satisfactory for general work. Whale-oil soap may, however, be substituted for the ivory soap with some addition to the killing power of the mixture.

Soaps are insecticides either because they are caustic and corrode the insect, or because they form a film of soap over the spiracles and choke it. Both results are obtained in strong mixtures of any soap,

but, practically, it has been found that fish-oil, combined or saponified with potash, makes the most effective insecticide.

A good fish oil soap may be made as follows :

| | |
|------------------------------------|------------|
| Concentrated potash lye, | 3½ pounds. |
| Water, | 8 gallons. |
| Fish oil, | 1 gallon. |

Dissolve the lye in boiling water and to the boiling solution add the oil ; boil for two and one-half hours, adding water slowly to make up loss in boiling, and then allow to cool.

Farmers with a proper outfit claim that this soap can be made for about one cent per lb., but it is difficult to obtain a uniform product.

Good fish, or so-called "whale oil," soaps, are made at from 3½ to 5 cts. per lb., according to quantity, by Leggett & Brother, Pearl St., New York (Anchor Brand), and James Good, South Randolph St., Philadelphia (Potash No. 3). Of the latter several thousand pounds are annually used in New Jersey with general satisfaction.

This soap may be used against plant lice and sucking insects generally, in summer, at the rate of 1 lb. in from 4 to 6 gallons of water. Against the San José or pernicious scale in winter it is used 2 lbs. in 1 gallon of water.

As a protection against borers, the stronger soap mixture may be painted on tree trunks in early summer, and renewed from time to time as needed. Carbolic acid, at the rate of an ounce to 1 gallon of soap, adds to its effectiveness as a repellant, and lime, sufficient to whiten, makes the wash more visible and somewhat more lasting. One of the arsenites may also be added and will occasionally kill a borer, where the other materials failed to prevent the adult from ovipositing.

Lime is often useful as an insecticide, and yet more generally as a repellant. Freely used as a whitewash on trees, fences, out-houses, etc., it reduces the number of hiding places for insects, for none of them like lime and few care to remain on a white surface, which renders them conspicuous to their natural enemies.

When used dry, it should be as caustic as possible. Air-slaked lime is fairly effective when fresh, but fresh dry-slaked is yet better, *i e.*, add just water enough to slake the lime into a dry powder, and sift this upon soft-bodied insects like slugs of potato or asparagus beetles when they are damp in the early morning. It burns holes in the skin of such insects and is effective in proportion to its freshness.

Crude carbolic acid, 1 pint to 100 pounds of lime, gives the latter a light pink color and makes it a good repellant against root mag-gots, &c.

Carbolic acid may be emulsified by boiling 1 pound of soap, shaved fine, in 1 gallon of water, adding crude acid 1 pint, and then churning as for a kerosene emulsion. Diluted with 30 parts of water, this mixture is effective as against root maggots attacking cabbage, onions, &c.

Turpentine has been used as a repellant with tolerably good effect, and one pint in a bushel of lime will make the latter effective in keeping the striped beetle from the base of melon and other vines.

Resin, and the lime, salt and sulphur washes are much used in the Pacific States and are very effective. In New Jersey the amount of moisture almost continuously present in the air and the frequent rains make them practically useless; but for information the formulas and method of preparation may be given.

Summer Resin Wash.

| | |
|--|--------------|
| Resin, | 20 pounds. |
| Caustic soda (70 per cent.), | 5 pounds. |
| Fish oil, | 3 pints. |
| Water sufficient to make, | 100 gallons. |

Winter Resin Wash.

| | |
|--|--------------|
| Resin, | 30 pounds. |
| Caustic soda (70 per cent.), | 9 pounds. |
| Fish oil, | 4½ pints. |
| Water to make, | 100 gallons. |

Boil all the ingredients together in twenty gallons of water until thoroughly dissolved, adding hot water from time to time, but not, after the boiling begins, enough to stop it. Three hours will be required for a complete mixture of the materials, hot water to make fifty gallons being gradually added and the mixture thoroughly stirred. After this the balance of the 100 gallons may be added in cold water.

Lime, Salt and Sulphur Wash.

| | |
|--------------------------|--------------|
| Unslaked lime, | 50 pounds. |
| Sulphur, | 25 pounds. |
| Stock salt, | 18 pounds. |
| Water to make, | 100 gallons. |

All the sulphur and half the lime are placed in a kettle, add 25 gallons of water and boil briskly for an hour and a half or until all the sulphur is thoroughly dissolved. The solution, yellow at first, will turn very dark brown, assuming more or less of a reddish tint and will finally change from a thick batter into a thoroughly liquid condition, the product being ordinary sulphide of lime. All the salt is added to the remainder of the lime and the latter slaked, after

which the slaked lime and salt are added to the sulphide of lime already obtained and boiled an hour longer, the whole being then diluted with water to make 100 gallons. It must be strained before application.

There are local variations in the preparation of this mixture, but the product is always a double sulphide of lime when the process has been thorough.

Caustic potash and caustic soda are much used as a winter wash on fruit trees and keep the trunks bright and clear of lichens, fungous growths, scales and other pests that would ordinarily winter in such places. One pound in one or two gallons of water is a usual strength, but must not be employed on foliage or active plant tissue.

Hot or very cold water may be sometimes used to advantage ; but their range is exceedingly limited, and usually some other substance is more satisfactory and actually less expensive.

Sulphur has also a limited range, and is practically useless in the field as an insecticide ; but in the greenhouse, where mites or red spiders are troublesome, it can be made very useful. Crushed or powdered sulphur in considerable quantity in a barrel of water may be stirred from time to time for weeks or months, and the sulphur water so formed may be used on the plants ; or flour of sulphur may be dusted on the ground or on the pipes so as to vaporize slowly.

Naphthaline is another substance more useful in protecting stored products indoors than for destroying field pests ; but it is excellent to keep " moths " from clothing and gnawing pests out of the wheat bin. It is a petroleum product, has a low melting point and ignites readily—a fact which should be kept in mind.

Bisulphide of carbon is a volatile liquid of vile odor, giving off fumes exceedingly poisonous to insect life, and it may be used in some cases to destroy insects in granaries or other moderately tight receptacles. The vapor is heavy and sinks; hence the material should be placed on top of the mass of grain to be cleared. Roughly, it requires a teaspoonful of liquid to fill one cubic foot of space with vapor, and seed grain may be exposed for 24 hours without danger to its germinating quality. In field practice the bisulphide is useful against the melon louse when it first appears and only isolated hills are affected. These can be covered with any sort of tight cover and a proper amount of the insecticide placed in a small dish—a clam shell will answer—the cover being kept on an hour at least. All hills so treated are thoroughly cleared and spread throughout the field may be so prevented. Ordinary bisulphide of carbon is expensive, but a " Fuma " bisulphide is made by Edward R. Taylor, Cincinnati, Ohio, which may be obtained at a satisfactory rate for insecticide purposes.

Hydrocyanic acid gas is largely employed on the Pacific coast in clearing trees of scale insects, and it is very effective. In the East it has been employed to any extent in Maryland only, but its usefulness is limited, because of the cost of the necessary outfit. The expense for materials is slight, but the tents and the labor required to move them when the trees are of any size bring the price beyond the ability of the average grower in New Jersey. In California, on large fruit ranches, the outfit pays in the long run, and in many districts the county owns the outfit and permits its use for a stated sum. In Maryland the State has made comparatively large appropriations and has given large powers to its entomologist.

But while fumigation can hardly be recommended under present circumstances for orchard work, it has a practical field in the nursery and directions for its use there may be in place. Nursery stock may be safely submitted to the hydrocyanic acid gas for hours and two or three times during the dormant season. The essential point is a tight house or box in which the stock is exposed to the fumes, and this may be of any desired size or shape, depending upon the caprice or necessity of the nurseryman. A house is better than a box and should be first sheathed with fair matched or halved stuff, diagonally, upright or otherwise, as desired. Then cover with a layer of building-paper well lapped at the joints and weather-board in the usual way so as to make an air-tight box. The roof may be iron, tin or tarred paper; only it must be as gas-tight as the sides. A shuttered window at one end and large doors at the other should also be double and should close tightly against felt or rubber strips. Both should be fitted to lock from the outside in such a way as to clamp door and shutter tightly in place. The bottom should be grated to keep the stock from the earthen floor, and it goes without saying that earth to cover the base should be banked against the house from the outside, while inside the sill should be at least half buried. In a small house a slide-box with a drawer reaching nearly to the middle may open on the outside of the house, and in this the jar with chemicals may be loaded, shoved into place when the house is closed, and the opening protected in any desired way while fumigation is going on. In a large house one or more jars may be placed near the middle in a protected space and the cyanide may be dropped in when all is ready to close doors immediately.

For nursery stock the formula for every hundred cubic feet of space is:

| | |
|---|--------------------|
| Cyanide of potassium, 98% pure, | 1 oz. by weight. |
| Sulphuric acid, sp. g. 1.83, | 1½ oz. by measure. |
| Water, | 2¼ oz. by measure. |

When the cubic contents of a house or box are ascertained, weigh out the cyanide in paper bags in small lumps for a day's use, and keep dry. Water and acid are measured out as required. The fumigating jar should be of glazed earthenware or glass, and should hold twice as much as is needed, to avoid spilling or sputtering over. When all is ready measure out *first* the water ; then the acid, which should be poured into the water slowly. The acid is very corrosive, and must be carefully used ; it heats when added to water, and boils violently when water in small quantity is added to it ; hence, the water should *never* be poured into the acid. When everything else is ready, drop the bag of cyanide into the diluted acid, and either shove in the slide or close the doors *at once*. It requires a few moments for the acid to eat through the paper bag, and this gives ample time for the operator to get out if the jar is loaded inside. Fumigation should continue at least two hours, and may continue safely all night. The fumigating house on the Village Nurseries at Hightstown is arranged so that a wagon-load of stock may be backed into it, and the stock fumigated without unloading. When the house is opened it should be allowed to ventilate at least ten minutes, door and window being both opened to facilitate the escape of gas, before it is entered. This fumigation will kill all plant lice and scale insects in any except the egg stage, unless they are protected by some accidental covering. No method can be entirely perfect, and a scale, or even a group of scales, may be so covered by a leaf, a spider-web or a cocoon that the gas does not reach it. Yet these instances will be rare, and the process is as nearly perfect as anything we have.

It will be noted that our insecticide battery is not on the whole a very large one, yet it is sufficient when intelligence is used in their application. There is an abundance of secret or patented insecticides at high prices, but these are best avoided as a rule. This caution does not apply to simple products like fish-oil soap, tobacco extracts or the like, which are often more cheaply purchased than made, but to products with fancy names which give no indication of the killing agent, like "Black death," "Kill M right," &c., all of which may be good, but are likely to be otherwise.

Preventive methods have not been touched upon, since they vary with almost every species against which they are used.

Finally, I do not mean to suggest that no materials other than those mentioned are useful for insecticide purposes, but the range of such substances is usually limited and their discussion would carry this chapter beyond all reasonable bounds.

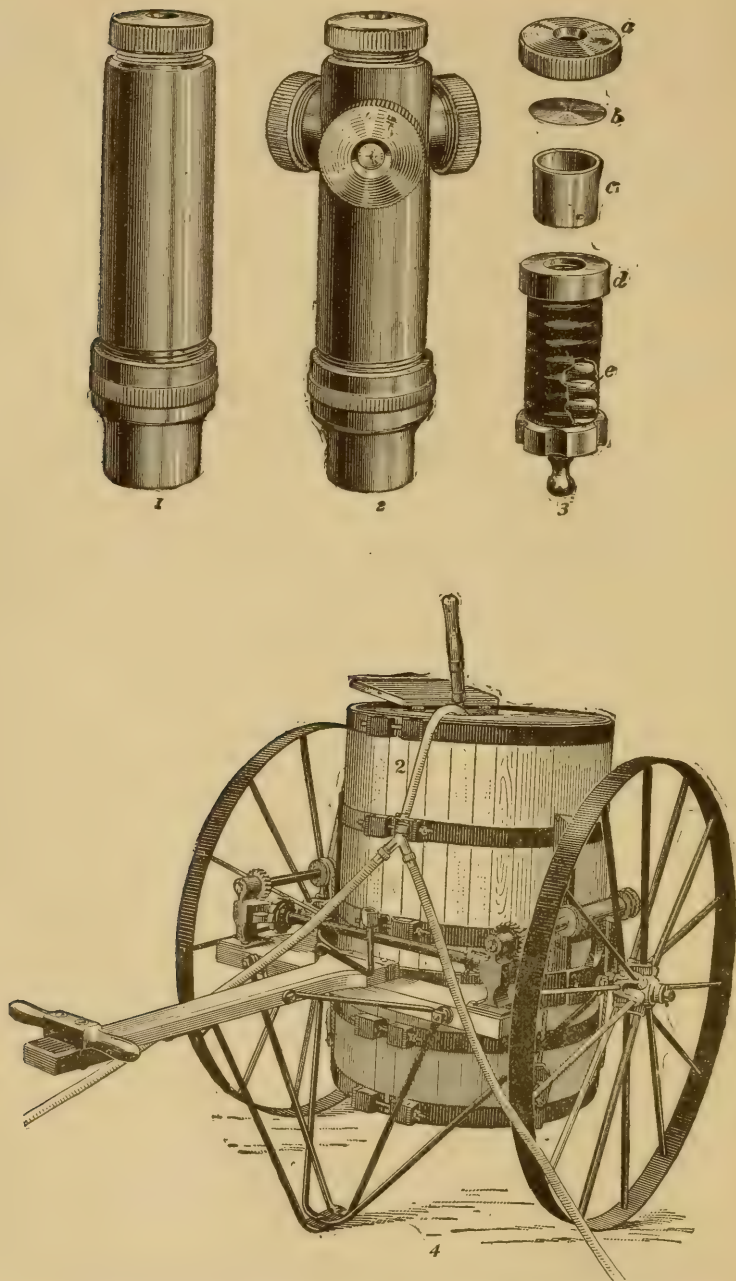


Fig. 2.—Pump and Monitor Nozzles used by the Gypsy Moth Committee in Massachusetts.

CHAPTER V.

MACHINERY.

The difficulty in dealing with this subject arises from the fact that so many changes and improvements are being constantly made in machinery for applying insecticides that the apparatus found satisfactory to-day may be set aside in favor of something much better by the time this book is distributed. Therefore a few general rules only can be given, meant to guide the farmer in purchasing.

And first of all determine exactly what the machine is wanted for, the capacity which it must have, the amount of power it is expected to develop and the general range of action needed.

Almost all leading makers of spraying machinery advertise in the more widely-circulated farm papers or journals, and it is good policy to study these advertisements carefully and write for a catalogue to every maker who seems likely to have what is wanted. I have found that, as a rule, the catalogues give a very fair description which may be relied upon as essentially correct, and from these catalogues, supplemented perhaps by a little correspondence, a satisfactory machine may be obtained.

It is always better to do this well in advance of the time when the machine is needed, as it may then be tested and its peculiarities discovered before actual field-work is attempted.

The highest priced apparatus is by no means always the best; but, on the other hand, it is poor policy to buy an outfit merely because it is cheap. In purchasing an outfit for spraying the grand essential is always a good pump, for without this nothing can be done even if everything else is perfect, and with it even a crude outfit will often do satisfactory work. The essentials are: brass cylinder and working parts; ball valves or brass-packed valves, requiring little or no attention during the season; a large air-chamber to secure uniformity of action; stout piston-rod and pump-handle so mounted as not to be easily twisted; cylinder of moderate diameter so that a maximum pressure may be obtained with a minimum amount of exertion. Almost everything else is subordinate, and may be at the pleasure or according to the means of the farmer. A further suggestion is to get a pump of large rather than small capacity; a little work may be done with a big pump; but much work cannot always be done with a little pump.

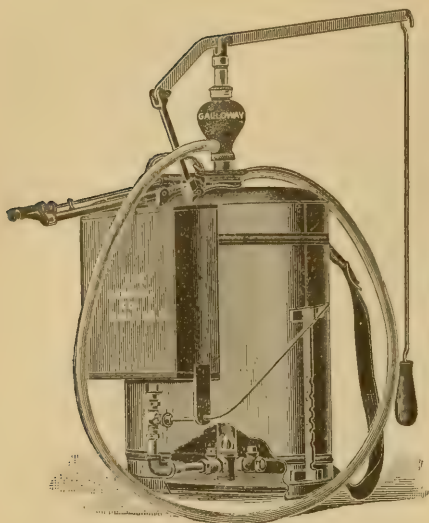


Fig. 3.—Deming Knapsack Emulsion Sprayer.

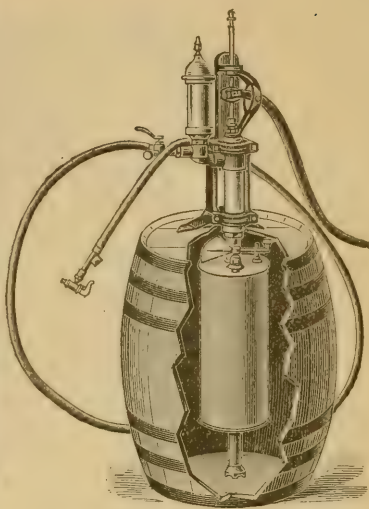


Fig. 4.—Deming Emulsion Sprayer.

It is not intended to advertise any maker of pumps here, for there are a considerable number who do almost equally good work; hence no addresses are given, and figures are introduced only to illustrate types of machines.

Where scale insects or plant lice are to be dealt with, it would be well to get an emulsion pump with which kerosene and water may be sprayed in a mechanical mixture. Such pumps are now made by several makers and usually so that the kerosene attachment may be removed and the machine used for ordinary spray-work.

When you have a good machine keep it in order, and never let it stand full of a mixture containing lime or a sediment of any kind. The reason for this is obvious enough, and it should not even need the suggestion; but I am afraid it does. The hose should also be cleaned each time, and it may all be done very easily by pumping clean water through the apparatus for a few minutes.

The next important item is the nozzle, and for making a fine spray nothing equals the vermorel. With a knapsack machine a single nozzle at the end of a three-foot lance or pipe is ample; in orchard work where a greater volume of spray is desirable a group of three such nozzles at the end of an 8 or 10-foot gas-pipe will be found very satisfactory. Sometimes a flat spray is needed, sent to a greater distance than is attainable with a vermorel, and in such cases a McGowen or Deming Bordeaux are useful. But this is another case where almost each maker has some special outfit, and most are good;

only the vermorel should be insisted on for fine spray, especially if oil is to be used. A useful nozzle is the Monitor, employed in the work of the Gypsy Moth Committee in Massachusetts.



Fig. 5.—Gould "Kerowater" Sprayer.

Atomizers holding from 1 pint to 1 quart of liquid are now sold almost all over the country, in every hardware store dealing in supplies for the farmer and in most seed and agricultural establishments. They are useful in applying undiluted crude or kerosene oil on small trees, but have no place in a field outfit.

In fact the only good advice that can be given, in view of the diversity of needs, is to study the subject thoroughly first before buying and to give yourself plenty of time to do it; to buy for durability, effectiveness and ease of working, and buy a good machine while you are about it.

Concerning machines for applying dry powders very little can be said, for there is only one of large capacity known to me, the "Champion Powder Gun," made by Leggett & Brother, of New York city.

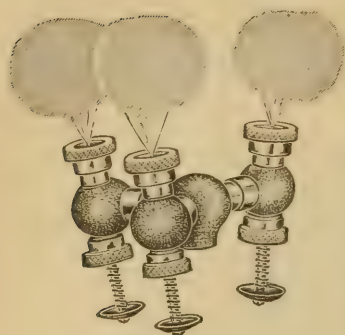


Fig. 6 —Vermorel Triplet, for use at end of a gas-pipe or bamboo pole.

Finally, a few words as to the practical application of insecticides. Given a proper machine, the necessary poison, the right time, and satisfactory weather conditions, there is yet one more thing needed : the proper man to do the work. Slouchy or sloppy work is always ineffective and throws discredit upon the method. It should be remembered that, if you are spraying a stomach poison, it must get to where the insects can feed upon it, otherwise it can do no good ; if you are spraying a contact

poison it must actually *touch* the insect to be effective. Spraying the outside of a tree to kill scale insects clustered on the twigs, trunk and branches, is waste of everything involved in the process, and thus the intelligent holder of the spray-nozzle is really the most important part of the whole outfit.

PART II.—LIST OF THE INSECTS OF NEW JERSEY.

ORDER THYSANURA.

The order *Thysanura* contains the so-called Spring-tails and Bristle-tails: minute wingless creatures with obscurely-developed mouth parts, no transformations, living usually in damp places in or among decaying or fermenting vegetation or under bark.

The latter type are called Spring-tails, because they have the power of leaping by means of a pair of anal appendages bent under the body, and these are the minute creatures often seen in potato or root-cellars when decay sets in, on the surface of manure-beds early in spring, where they cover the soil in untold numbers, and hopping about on the surface of the water when meadow or bog-land has been flooded by a rain. On recently-flowed cranberry bogs acres of water-surface may be seen covered by them in late fall

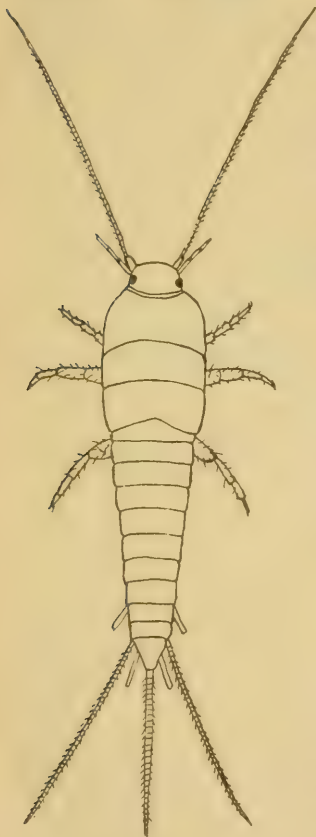


Fig. 7.



Fig. 8.



Fig. 9.

Fig. 7.—Silver-fish, *Lepsima* sp; very much enlarged.

Fig. 8.—Podurid, commonly found on manure beds; the spring not visible because curved beneath the body; much enlarged.

Fig. 9.—Podurid, spring extended to show the appearance of the entire insect in outline; much enlarged.

They are usually charged with causing the decay with which they are associated ; but as a matter of fact their presence is a consequence rather than a cause of the condition with which they occur. In manure they are rather beneficial because they assist in decomposing it, and in the field they are at least not harmful. In cellars a free use of dry lime will keep them down.

A common type often seen in houses is the "fish-moth," a species of *Lepisma*, also called a "silver-fish," because of the snow-white scales with which it is covered. This is the largest of our species, $\frac{1}{4}$ of an inch in length, with long antennæ and long anal filaments, often seen running rapidly in drawers, among papers or linen, and in closets. It feeds on starchy substances and sometimes gnaws the binding of books or the bosoms of boiled shirts. Camphor or naphthaline will serve to keep them off, while pyrethrum kills them if dusted where they run.

I am, unfortunately, unable to present any list of species in this order, because no collections have been made. There have been very few students of these creatures, interesting as they are, and perhaps the majority of the species are yet undescribed. If all of them were listed that are described from the eastern United States, they would probably be less than 50 in number.



Fig. 10.—*Pipirus* sp. from the side, to show the spring and the sucker at base of abdomen.

ORDER EPHEMERIDA.

These are popularly known as "May flies" because of the time of their greatest abundance, and "day flies" because of their short life in the adult stage. The ordinal term is based upon the same peculiarity in their life-history. The adults have two pairs of wings, very closely net-veined, frail in texture, and the anterior much larger than the posterior. The head is large, set on a distinct neck, the mouth parts are aborted, the eyes prominent and the antennae very short. The body is loosely jointed and the abdomen has long anal filaments, varying from three to five in number. The insects are attracted to light, and swarms often come on favorable evenings in early summer to the electric lights in our cities. The early stages are passed in the water, the larva, half crustacean in appearance, feeding upon the mud and ooze for a considerable period of years in some species.

There are many peculiar and interesting characters in this the oldest or least developed of our Neuroptera; but their existence can only be indicated here. None of the species are of any economic importance from any point of view.

Family EPHEMERIDÆ.

POLYMITARCOYS Eaton.

P. alba Say. New Brunswick in July.

HEXAGENIA Walsh.

H. bilineata Say. Caldwell (Cr), Westville VI, Riverton VII (Jn), New Brunswick.

H. limbata Say. Echo Lake, Passaic County, VII, 2, Normanock, Sussex Co. VII (Ds).

EPHEMERA Linn.

E. decora Wlk. Caldwell, common (Cr).

BLASTURUS Eaton.

B. cupidus Say. Fort Lee V, I, Staten Island IV, 17, 27 (Ds), Caldwell (Cr), Westville IV, 9 (Jn), Jamesburg.

B. nebulosus Wlk. Caldwell (Cr).

HEPTAGENIA Walsh.

H. canadensis Wlk. Caldwell (Cr), Del. Water Gap VII (Jn), New Brunswick.

H. fusca Wlk. Caldwell, not rare (Cr).

H. interpunctata Say. Riverton, VII (Jn).

H. pulchella Walsh. Del. Water Gap VII (Jn).

H. verticalis Say. Canada to Georgia.

H. vicaria Wlk. Canada to Georgia.

BAETISCA Walsh.

B. obesa Say. Caldwell, not rare (Cr).

LEPTOPHLEBIA Westw.

L. mollis Eaton. New Hampshire to North Carolina.

L. præpedita Eaton. Riverton V (Jn).

EPHEMERELLA Walsh.

E. excrucians Walsh. New Brunswick.

BAËTIS Leach.

B. unicolor Hagen. Washington, D. C.

B. flaveola Pict. Canada to Virginia.

B. propinquus Walsh. Del. Water Gap, VII (Jn).

CALLIBAËTIS Eaton.

C. americana Banks. Staten Island (Ds).

C. ferruginea Walsh. Canada to Southern States.

CLEON Leach.

C. vicinum Hagen. Caldwell, common (Cr).

C. undata Pict. New York to Cuba.

CÆNIS Steph.

C. diminutiva Wlk.=*amica* Hagen. New York to Florida.

C. hilaris Say. Riverton, VII (Jn).

ORDER PLECOPTERA.

The "Stone flies" which constitute this order are loose-jointed, flattened, soft-bodied creatures with long net veined wings, the hind pair longitudinally folded beneath the anterior. The head is large, the mouth parts soft, antennæ long and tapering, eyes rather prominent. The prothorax is free and quadrate, the other segments loosely joined. The abdomen is soft and usually with anal filaments or processes. These "flies" are found along the streams and rivers in which their larvæ occur, resting on the leaves and not easily disturbed; their flight is heavy and they do no feeding upon living plants so far as known. The larvæ live in the streams under stones to which they cling so closely that, being flattened, they are easily overlooked. They breathe by means of lateral gill tufts which occur also on the head and which, in some species, persist even in the adult stage; a curious reminder of ancient conditions and an indication of the low type of the order. The pupa is active and the transformation incomplete.

It is very probable that many more species occur than we have yet found, but what is already known shows that they form an important part of the aquatic fauna in numbers as well as species, though of no importance to the agriculturist.

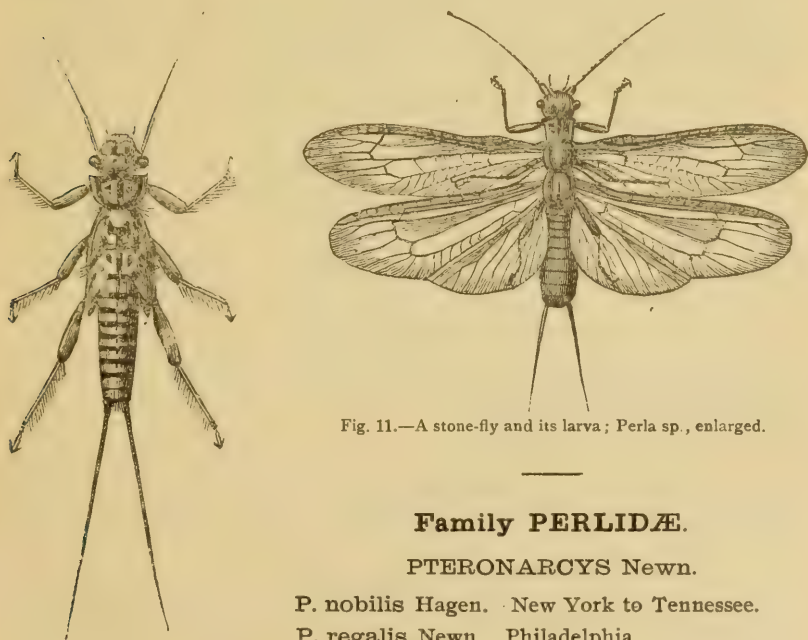


Fig. 11.—A stone-fly and its larva; *Perla* sp., enlarged.

Family PERLIDÆ.

PTERONARCY'S Newn.

P. nobilis Hagen. New York to Tennessee.

P. regalis Newn. Philadelphia.

ACRONEURA Pict.

- A. abnormis Newn. Newfoundland VI (Ds), Philadelphia
A. arida Hagen. New York and Philadelphia

ISOGENIUS Newn.

- I. frontalis Newn. Canada, New York, Ohio.

PERLA Geoff.

- P. annulipes Hagen. Washington, D. C.
P. ephyre Newn. New York to Georgia.
P. placida Hagen. Riverton VII (Jn).
P. postica Wlk. Canada to Georgia.
P. similis Hagen. Pennsylvania and Maryland.
P. tristis Hagen. Delaware Water Gap, VII, 3 (Ds).
P. xanthenes Newn. Pennsylvania to Georgia.

PSEUDOPERLA McGilliv.

- P. occipitalis Pict. New Brunswick IX, 19.

CHLOROPERLA Pict.

- C. maculata Pict. Philadelphia.
C. virginica Banks. Del. Water Gap VII (Jn).

ISOPTERYX Pict.

- I. cydippe Newn. New York to Georgia

CAPNIA Pict.

- C. necydaloides Pict. Staten Island, III (Ds).
C. pygmæa Burm. New York and Pennsylvania.

TÆNIOPTERYX Pict.

- T. fasciata Burm. Caldwell (Cr), Staten Island IV (Ds).
T. maura Pict. Philadelphia.
T. similis Hagen. Caldwell (Cr).

NEMOURA Pict.

- N. albidipennis Wlk. Canada to Virginia.

LEUCTRA Pict.

- L. tenuis Pict. Philadelphia.

ORDER MALLOPHAGA.

The insects of this order are called biting lice to distinguish them from the parasitic forms of the *Hemiptera* or sucking lice. They occur on warm-blooded animals generally, but have been called bird lice because avian parasites are confined to members of this order. They live among the hair and feathers of their host, feeding upon the body scurf, upon the soft tissues at the base of the feathers and hair, upon dried blood from wounds, and generally upon whatever they can scrape from the surface. While they do not actually feed upon the live tissues of the animal or suck blood, they create a more or less continuous irritation and cause a mangy appearance due to loss of hair and feathers. In shape they are flattened, with broad obtuse head, short feelers and often bulging eyes. Eggs are attached to the hair or feathers of the host and the young resemble the adults in general appearance; there being no obvious transformations.

Remedial measures for birds are, plenty of dust with which they may thoroughly powder themselves and the free use of crude petroleum in the chicken or other fowl-houses. On the larger animals of the barn-yard, thorough brushing with a stiff brush, which may be dipped occasionally in crude petroleum. The petroleum is better than the kerosene, because it does not take the hair from horses or cows. Dogs and cats are rarely infested and can be easily cleaned with carbolic soap washes or pyrethrum. Where its application is convenient, vaseline can be employed to good advantage. Washing with kerosene emulsion diluted ten times has been found successful in some directions, and, indeed, it is merely a matter of determination and persistence until the pests are thoroughly destroyed.

Family PHILOPTERIDÆ.

DOCOPHORUS Nitzsch.

D. icterodes Nitzsch. Infests ducks and geese.

GONIOCOTES Burm.

G. hologaster Nitzsch. The smaller of the biting chicken lice.

G. abdominalis Piaget. The larger biting Chicken louse: both species are common.

G. compar Nitzsch. A common form on domestic pigeons.

G. rectangulatus Nitzsch. A very small species occurring on the Peacock.

G. burnettii Pack. Also a chicken louse, though less common.

GONIODES Nitzsch.

G. numidianus Denny. Occurs on the Guinea fowl.

G. damicornis Nitzsch. Parasitic on pigeons.

G. stylifer Nitzsch. A common parasite on Turkeys.

G. falcicornis Nitzsch. Parasitic on the Peacock.

LIPEURUS Nitzsch.

L. tadornæ Denny. Parasitic on the Shell-drake.

L. baculus Nitzsch. The most common of the biting lice of Pigeons.

L. squalidus Nitzsch. A common parasite on ducks of all kinds.

L. polytrapezius Nitzsch. Parasitic on Turkeys

L. variabilis Nitzsch. Occurs on domestic fowls.

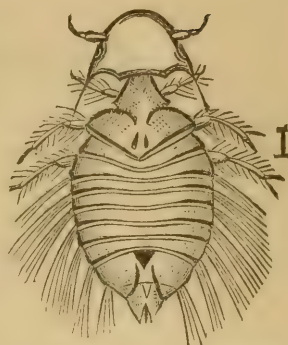


Fig. 12.—Turkey louse, *Goniodes stylifer*; much enlarged.

TRICHODECTES Nitzsch.

T. subrostratus Nitzsch. Biting louse of the Cat.

T. latus Nitzsch. Biting louse of the dog.

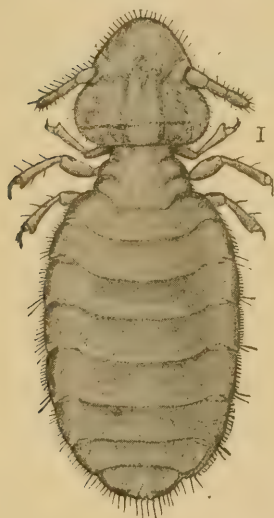


Fig. 13.

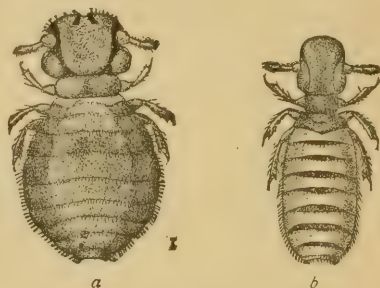


Fig. 14.

Fig. 13.—Cow-louse, *Trichodectes scalaris*; much enlarged.

Fig. 14.—Dog-louse and sheep-louse, *Trichodectes latus* and *sphærocephalus*, much enlarged.

T. pilosus Giebel. Parasitic on the horse, mule and ass.

T. parumpilosus Piaget. Found with the preceding.

T. scalaris Nitzsch. Found commonly on Cattle and sometimes so abundant as to give cows a mangy appearance.

Family LIOTHEIDÆ.**MENOPON** Nitzsch.

M pallidum Nitzsch. This is the most abundant of the hen or chicken lice.

TRINOTUM Nitzsch.

T. luridum Nitzsch. The common duck louse.

T. lituratum Nitzsch. Parasitic on the goose.

ORDER ISOPTERA.

This order is represented in our State by a single species only, commonly called a "white ant" or, more properly, a Termite. These "white ants" may be found in dead or decaying stumps, logs or even standing trunks, or under stones in woodland. They have a large head without eyes, short feelers, a small

thorax with short legs, a soft, somewhat flattened, oval abdomen, and are about one-quarter of an inch long. These are the workers and their jaws are only moderately developed. Scattered among them are somewhat larger individuals with long, sharp-pointed mandibles, and these are soldiers. In the spring yet larger, chestnut brown, winged individuals are found and these are male and female which swarm in May or June in immense numbers.

They never attack growing vegetation in our State; but are generally found in the roots or stumps of partly decayed trees and may hasten its death.

Fig. 15.—*Termes flavipes* or "white ant," showing the castes: *a*, larva; *b*, winged male; *c*, worker; *d*, soldier; *e*, large female; *f*, pupa. Natural size marked by lines.

Sometimes they get into the woodwork of fences and buildings, and may, under such circumstances, do considerable injury. Remedial measures must be adapted to the peculiarities of the case in hand.

The species that occurs with us is listed as follows:

Family TERMITIDÆ.

TERMES Linn.

T. flavipes Koll. Found throughout the State.

ORDER CORRODENTIA.

This order is composed of a rather small number of soft-bodied insects with a large head which, while it is not sunken into the prothorax, has no distinct neck. The mouth parts are small, fitted for gnawing, and the antennæ are very long and slender. Many are wingless, and these are the "book-lice" which are found in dry, dusty places feeding on starchy materials, gnawing the calendered surface of paper and occasionally damaging museum specimens. They resemble parasites in shape, but run rapidly and have the posterior thighs much enlarged. The winged forms occur on the bark of moss or lichen-covered trees, and are sluggish flyers, preferring to drop when disturbed rather than use their wings. The venation of these wings is very peculiar, by the bye, the cells being irregular and the individual veins tortuous in course.

The wingless forms are mainly referred to the *Atropidæ*, while the winged forms are in the family *Psocidæ*.

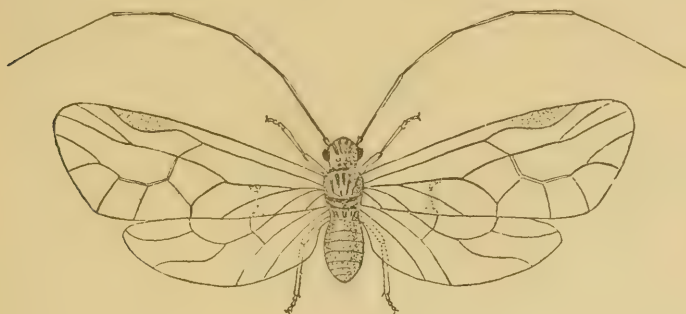


Fig. 16.—*Psocus lineatus*, much enlarged.
This represents the forms usually found on tree trunks.

Family ATROPIDÆ.

HYPERETES Hagen.

H. tessulatus Hagen. Maine to Kentucky.

CLOTHILLA Westw.

C. pulsatoria Linn. New Brunswick, and probably g. d.

ATROPOS Leach.

A. divinatoria Fabr. "New Jersey," Plainfield (U S Ag). This or an allied species is common in houses among books, in dusty drawers, sometimes among linen, where it excites the apprehension of the housekeeper who



Fig. 17.—A book-louse, *Clothilla* sp.; much enlarged. This represents the form commonly found in houses.

may easily mistake it for a parasite. Found also among collections of natural history specimens and is easily held in check by a free use of naphthaline.

A. purpurea Aaron. Near Philadelphia.

DORYOPTERYX Aaron.

D. pallida Aaron. Philadelphia

Family PSOCIDÆ.

CÆCILIUS Curt.

C. definitus Aaron. Philadelphia.

C. impactus Aaron. Philadelphia.

C. pedicularis Linn. Massachusetts, New York, Illinois.

ELIPSOCUS Hagen.

E. pumilis Hagen. New York.

E. unipunctatus Muell. New York, Massachusetts.

E. maculosus Aaron. Philadelphia.

MYOPSOCUS Hagen.

M. lugens Harr. Massachusetts to District Columbia.

PERIPSOCUS Hagen.

P. madidus Hagen. New York to Georgia.

AMPHIENTOMUM Pict.

A. hageni Pack. Philadelphia.

AMPHIGERONTIA Kolbe.

A. juvenilis Kolbe. Pennsylvania.

A. moestus Hagen. New England, Georgia.

A. variegatus Fabr. New York to Georgia.

PSOCUS Latr.

P. atratus Aaron. Philadelphia.

P. contaminatus Hagen. New York to District Columbia.

P. inornatus Aaron. Philadelphia.

- P. quietus* Hagen. New York to Georgia.
P. sexpunctatus Linn. Philadelphia.
P. sparsus Hagen. Massachusetts to Virginia.
P. striatus Wlk. Canada to Virginia.
P. variabilis Aaron. Pennsylvania.
P. venosus Burm. Freehold (U S Ag), Egg Harbor City VIII, on cherry trunks and locally common.

The species of this order have not been collected in this State. It is reasonably certain that all those above listed will occur, and quite certain that many yet undescribed species remain to be discovered by the careful student.

None of the species are of economic importance, though their occasional appearance in large numbers on orchard trees sometimes creates alarm.

ORDER PLATYPTERA.

The species occurring with us are large in size, with the head as broad or broader than the square or oblong thorax, the mandibles large and sometimes prominent, antennae many-jointed and often pectinated in the male. The wings are large, net-veined, the posterior not much the larger, and folded only once near the anal angle when at rest beneath the anterior pair which covers them. The early stages are passed in the water, under stones or among the vegetation at the bottom of running streams. The larvæ are rather long, usually blackish, and breathe by means of a series of gill tufts. They are favorite fish-food and are used as bait by fishermen when they can get them. When full grown the larvæ crawl on shore, bury in the soil in an old stump or under stones and pupate: the transformations being complete.

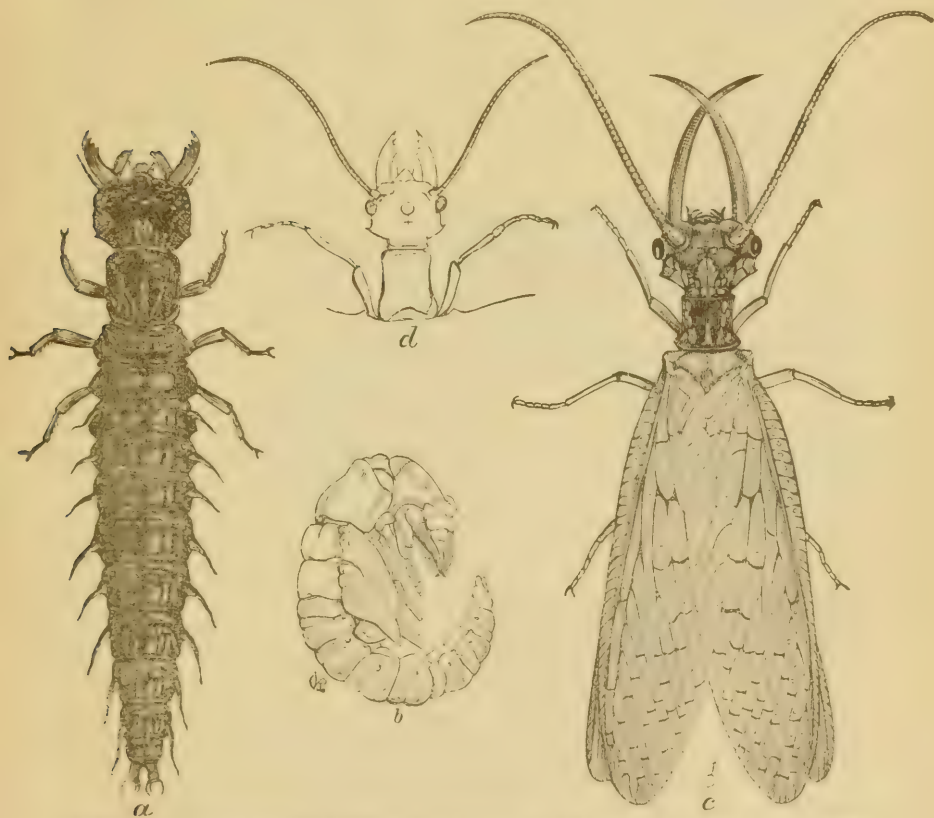


Fig. 18.—*Corydalus cornutus*: a, the larva, "hellgrammite" or "dobson"; b, the pupa; c, male adult; d, head of the female, showing the comparatively small jaws: natural size.

The adults called "fish flies" are sluggish and, though common throughout the State, are rarely seen. They are quite usually sent to the Station with the record that nothing of that kind had ever been seen before by even the oldest inhabitant.

None of the species feed upon growing vegetation.

Family SIALIDÆ.

SIALIS Latr.

S. infumata Newn. New Brunswick.

S. americana Ramb. New York to Georgia.

CHAULIODES Latr.

C. lunatus Hagen. Newark.

C. pectinicornis Linn. Staten Island VII (Ds), Summit, Long Branch (U S Ag), Caldwell (Cr), Short Hills (Bt), New Brunswick: seems to be the most common of the fish flies.

C. rastricornis Ramb. New York to Georgia.

C. serricornis Say.=*maculatus* Say. Caldwell (Cr), Lakewood, New Brunswick.

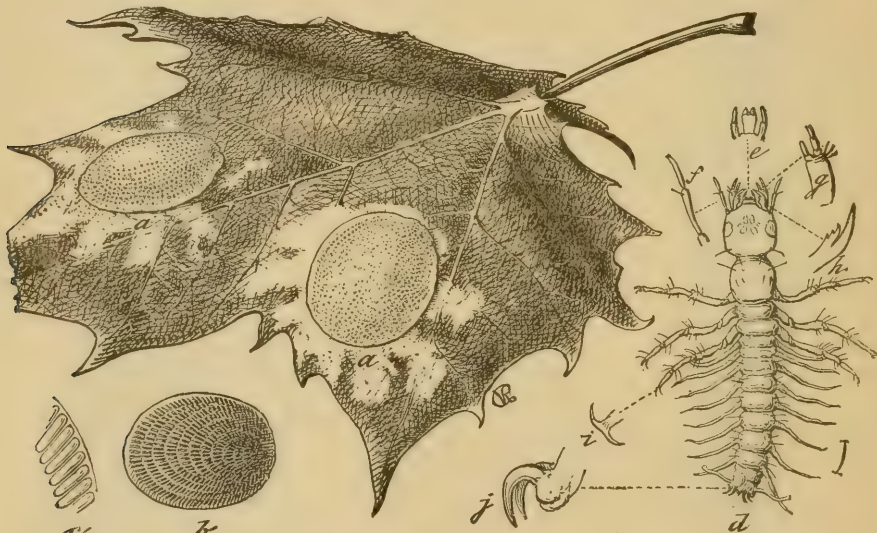


Fig. 19.—Early stages of *Corydalus cornutus*: *a*, egg-mass on leaf; *b*, same, detached, from the under size—natural size; *c*, single eggs, enlarged; *d*, newly hatched larva, enlarged; with structural details yet further enlarged *e* to *j*.

CORYDALUS Latr.

C. cornutus Linn. Throughout the State late June to August: more common northwardly where the larvæ, known as "Dobsons" or "Hellgram-mites," are abundantly found under stones in running streams and brooks.

ORDER NEUROPTERA.

In its original or Linnaean scope this order included all the net or nerve-winged insects; hence was easy of definition. It is one of the most ancient of the orders in this sense and divergences left their mark in the form of remnants, retaining the original wing type, but differing greatly in other respects. The first division was upon the character of the transformations and we had *Pseudo-neuroptera*, where the metamorphoses were incomplete, and *Neuroptera*, where they were complete. This was unsatisfactory because nothing in the adult indicated the nature of its transformations and also because, in this very order where the change in the character of the metamorphosis occurred there were a number of transition forms that were not easily classified. Hence the modern tendency to give each compact group ordinal rank, and this I consider the correct solution. Unfortunately there is yet no entire agreement as to where the lines of division should be drawn and in the limitation here adopted the fish-flies are excluded, contrary to the belief of some other authorities.

As the order is limited here it contains insects that have a moderately compact thorax, the prothorax being well developed yet immovably connected with the mesothorax whatever its size, no distinct neck between it and the head and four large net-veined wings which are not folded and are carried obliquely or roof-like when at rest. All of them are terrestrial in all stages, all are predatory in character though, in one case at least, with a tendency to parasitism, and in all there is a complete metamorphosis. The wings are not densely hairy in any case; there is no difference in texture between the two pairs and usually not much in size.

There are several families occurring in New Jersey that differ considerably in habit and appearance, though most of them are of small extent.

The *Mantispidæ* have only two representatives thus far known from our State, and these are remarkable looking forms, with long pro-thorax and immense clasping fore legs, much resembling the *Mantes* which belong in the *Orthoptera*. The larvæ prey upon the eggs of spiders and are semi-parasitic, living in the egg-sac and becoming partly grub-like in form. As they are so rare with us they cannot be considered of economic importance.

The *Coniopterygidae* are almost equally scarce. The species I have seen are small, covered with a white mealy powder which makes them easily recognizable, and the hind wings are unusually small. The larvæ, so far as their habits are known, feed on scale insects and resemble in form those of the *Aphis* lions. So far as they go, therefore, the insects are beneficial.

The *Chrysopidae*, *Aphis* lions, golden-eyed flies, or lace-wing flies, are well represented with us and distinctly useful. The term "*Aphis* lion" refers to the habits of the larva which is spindle shaped, a little flattened, with prominent long mandibles which are grooved on the inner side. This larva clasps a plant-louse, punctures it and draws in the juices, the body being thrown away when exhausted. The adult is green in color, the wings very

transparent and delicate, whence the name lace-winged is derived ; the eyes hemispherical, prominent and golden bronzed. They have a peculiarly sickening odor when handled, reminding one of an ill-kept urinal. They are decidedly beneficial and sufficiently numerous to be accounted a notable check to plant-lice increase.

The *Hemerobiidae* resemble the preceding in appearance and habits, but are usually brown in color and there is a structural difference in venation, which is technical in character. The larvæ make a sac for themselves of the skins of their victims and other dirt particles. The eggs in both families are laid at the top of a slender thread or stalk and pupation takes place in a round parchment-like cocoon.

The *Myrmeleonidae* are ant lions in the larval stage, and the adults are much larger than any of the preceding families, besides having the antennæ clubbed at tip : gradually so when they are short, abruptly when they are long. The larvæ have the peculiar habit of building a conical pit in sand or dry earth, at the bottom of which they await the prey that may unwarily investigate too close to its edge. They can scarcely be considered useful, though, at least, not in any way injurious.



Fig. 20 —
Ant-lion.

Taken as a whole, then, the order is decidedly useful or beneficial from the economic standpoint.

It may be in place here to say that the general arrangement in all the Neuropterous orders is based upon the Catalogue published by Mr. N. Banks in the Trans. Am. Ent. Soc., vol. xix, 1892.

Family MANTISPIDÆ.

MANTISPA Ill.

M. brunnea Say. New Jersey (Bt), Jamesburg VII, 4, very rare.

M. interrupta Say. Philadelphia, Lahaway in June.

Family CONIOPTERYGIDÆ.

ALEURONIA Fitch.

A. westwoodii Fitch. South Jersey, on oak, July.

CONIOPTERYX Halid.

C. vicina Hagen. Washington, D. C.

Family CHRYSOPIDÆ.

NOTOCHRYSA McLach.

N. virginica Fitch. Staten Island VIII (Ds).

CHRYSOPA Leach.

C. oculata Say. Staten Island VI, VII, VIII (Ds), New Brunswick IX, 8, Jamesburg VIII, 4, Gloucester VII, 15, Lahaway VII, 5, Atlantic County: probably throughout the State.

C. albicornis Fitch. Riverton VIII, Burlington County, VIII.

C. latipennis Schneid. Caldwell (Cr).

C. illepada Fitch. New York, ranging thence south and west.

C. ypsilon Fitch. New Brunswick, IX.

C. nigricornis Burm. Staten Island VIII, IX (Ds).

C. lineaticornis Fitch. New York and g. d.

C. quadripunctata Burm. Staten Island IX (Ds), and probably throughout the State.

C. rufilabris Burm. Staten Island IX, XI (Ds), New Brunswick IX, 18.

C. interrupta Schneid. New York and Pennsylvania in August.

C. sulphurea Fitch. "New Jersey" (Banks).

C. plorabunda Fitch. Anglesea IX, 6.

C. flava Scop. Philadelphia (Hagen).

C. tabida Fitch. New Brunswick: the common species whose larva feeds on the slugs of the elm-leaf beetle and other soft larvæ on the fences and tree trunks.

C. harrisii Fitch. Manchester IX, Staten Island X, 18 (Ds).



Fig. 21.—Lace-wing fly, *Chrysopa* sp., showing the stalked eggs from the side, the larva, the small round cocoon intact and with the lid opened, and the adult with wings of one side absent: about natural size



Fig. 22.—Lace-wing fly and its eggs from the side; wings shown as held when the insect is at rest.

Family HEMEROBIIDÆ.

POLYSTÆCHOTES Burm.

P. punctatus Fabr. Philadelphia, and eastern U. S. generally.

P. vittatus Say. "New Jersey" (Hagen).

HEMEROBIUS Linn.

H. amicus Fitch. New York, on peach trees, May to October.

H. alternatus Fitch. New York, on pine and Hemlock in June.

- H. fidelis* Banks. Riverton, VII (Jn).
H. castanea Fitch. Everywhere common, on chestnut, walnut and other trees (Fitch): Staten Island VI (Ds), New Brunswick.
H. stigmaterus Fitch. Staten Island (Ds), Riverton, III (Jn), common throughout the northern U. S., March to October (Fitch).
H. tutatrix Fitch. On apple trees in September, New York to Virginia, and west to California.
H. pinidum Fitch. Clementon, VIII (Jn).
H. hyalinatus Fitch. New York, on pine, May to July.

MICROMUS Ramb.

- M. insipidus* Hagen. Philadelphia (Hagen) and "eastern U. S."
M. posticus Wlk. Westville VII, Riverton VII (Jn).

BEROTHA Wlk.

- B. flavicornis* Wlk. Prospertown IX, 22.

Family MYRMELEONIDÆ.

ACANTHACLISIS Ramb.

- A. americana* Dru. Sandy Hook, VIII & IX, rare (Bt), Anglesea, VIII, 1 specimen.

DENDROLEON Hagen.

- D. obsoletus* Say. Lahaway, VII, 4, IX, 20 (Brakeley), Jamesburg VII, 21.

- D. gratus* Say. Philadelphia, and certain to occur in New Jersey.

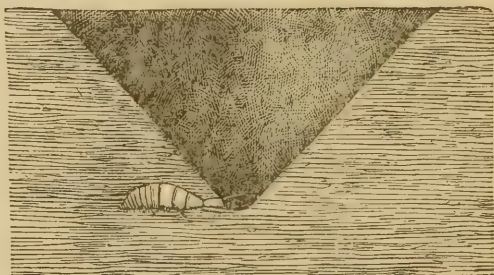


Fig. 23.—Section through the pit of ant-lion, showing the insect in position at the bottom.

MARACANDA McLach.

- M. conspersa* Ramb. Lahaway VII, 8-18 (Brakeley).
M. signata Hagen. Almost certain to occur in New Jersey.

BRACHYNEMURUS Hagen.

- B. abdominalis* Say. Lahaway VI, 28, VIII, 3-17 (Brakeley), Shark River VII, 9 (Jn), Jamesburg VII, 21, Anglesea IX, 4, New Brunswick VII, 23, very common.
B. pumilis Burm. Staten Island, a small species and usually rare (Ds).

MYRMELEON Linn.

M. immaculatus DeG. Caldwell
(Cr), Staten Island IX (Ds).

M. rusticus Hagen. Lahaway
VI, 28, VII, 3 (Brakeley).



Fig. 24.—*Myrmeleon* sp. Winged adult.

**ULULODES Currie=
ASCALAPHUS.**

U. hyalinus Latr. Anglesea IX, 4, occasional at light.

U. 4-punctatus Burm. Belmar VII, 9 (Jn), Anglesea, New Brunswick VIII, 3.

COLOBOPTERUS Burm.

C. excisus Hagen. Belmar VII, 1 specimen (Jn).

ORDER MECOPTERA.

The "scorpion flies" are a curious remnant of what I believe has been a synthetic type from which the Hymenoptera and Diptera have been derived. They have narrow, net veined wings, the cross veins rather few in number, laid flat across the back when at rest. The mouth parts are mandibulate and set at the end of a proportionately long beak, so that the order is readily recognizable.



Fig. 25.—A male scorpion-fly: *Panorpa* sp., somewhat enlarged.

In the males of *Panorpa* the abdomen is furnished with a curiously jointed forceps, curved upward so that it somewhat resembles the tail with a sting of a scorpion; and this gives the insect its common name. The flies are predatory and feed upon a variety of small insects.

The larvæ are caterpillar-like in shape, have 8 pairs of fleshy pro-legs, live in damp soil and are predatory in habit. The pupal stage is quiescent.

The species of *Boreus* occur during the winter or very early in Spring, usually on the surface of newly fallen snow after a short period of mild weather. They are of little practical importance; but are certainly not in any way injurious.

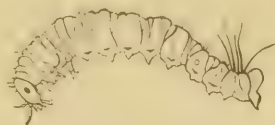


Fig. 26.—Larva of a scorpion-fly enlarged.

Family PANORPIDÆ.

BITTACUS Latr.

- B. occidentis* Wlk. Recorded from Pennsylvania.
- B. strigosus* Hagen. New York to District Columbia.

PANORPA Linn.

- P. debilis* Westw. Staten Island VI, VII, VIII (Ds), not uncommon at Jamesburg.
- P. maculosa* Hagen. New York and Pennsylvania.
- P. nebulosa* Westw. Staten Island VI, (Ds), New Jersey, not common (Bt), Del. Water Gap, VII (Jn).
- P. rufescens* Ramb. "New Jersey" (Bt), Caldwell (Cr), Little Falls VIII (Ds), Del. Water Gap VII (Jn), Riverton IX and g. d.
- P. venosa* Westw. Sparta VII (Ds), eastern United States generally.

MEROPE Newn.

M. tuber Newn. Pennsylvania to Virginia.

BOREUS Latr.

B. brumalis Fitch. Staten Island XII, 6 (Ds), on snow, New York, in April.

B. nivoriundus Fitch. Found on snow, New York, in early spring.

ORDER TRICHOPTERA.

The "caddice" or "case-flies," are so named from the fact that the larvæ make cases or tubes of stones, sticks and the fragments in which they live. They are aquatic, resemble caterpillars in shape, but have the thoracic legs very long, the others small or obsolete, the entire hind body being soft. Usually they frequent running brooks, streams or ditches; but some live in water that is sluggish or almost stagnant. The adults have a free head with distinct neck, a compact thorax, abdomen without anal appendages, and four net-veined wings, the posterior folded under and covered by the anterior. The antennæ are usually very long, the fore-wings are narrower than the hind-wings and are covered with fine hair which sometimes becomes scale-like. In texture the primaries are sometimes a little stouter and, altogether, the insects at rest very much resemble moths. The mouth parts are obscurely mandibulate and, in a few cases, fairly developed; but in many others they are so rudimentary as to be entirely useless for feeding purposes. It is believed that in the *Trichoptera* we have the direct ancestors of the *Lepidoptera*.

The species are quite numerous, and have not been much collected: it is very probable, therefore, that many additions will be made to the list in the future. As a whole they are indifferent to the farmer.



Fig 27.—Caddice-fly cases of varying types.

Family PHRYGANEIDÆ.**PHRYGANEA** Linn.

P. interrupta Say. "New Jersey" (Say), Caldwell (Cr).

P. vestita Wlk. Staten Island, V (Ds).

NEURONIA Leach.

N. concatenata Wlk. Canada to Florida.

N. ocellifera Wlk. Staten Island VI, VII (Ds), Caldwell (Cr), Orange Mts., Jamesburg, Anglesea VI, 10.

N. postica Wlk. Caldwell (Cr), New Brunswick, VI, Orange Mts., Lahaway VI, 1, VII, 7.

N. semifasciata Say. Orange Mts. (Bt), Caldwell (Cr).

N. stygipes Hagen. Staten Island, Fort Lee V (Ds).

N. dossauria Say. Buena Vista VI, (Jn).

Family LIMNEPHILIDÆ.**GONIATAULIUS** Kol.

G. pudicus Hagen. Riverton IV (Jn), New Brunswick.

HALESUS Steph.

H. argus Harr. Staten Island VI (Ds).

H. guttifer Wlk. Canada to Georgia.

H. hostis Hagen. Manchester, VI (Ds), Jamesburg VII, 4 (Jn).

PLATYPHYLAX McLach.

P. lepida Hagen. Pennsylvania (Hagen).

P. subfasciata Say. Philadelphia (Hagen).

STENOPHYLAX Kol.

S. scabripennis Ramb. Manchester IX (Ds).

CRYPTOTHRIX McLach.

C. difficilis Wlk. Staten Island XI & XII (Ds).



Fig. 28.—A caddice fly, *Limnephilus rhombicus*; enlarged.

Family SERICOSTOMATIDÆ.**SERICOSTOMA** Latr.

S. americana Wlk. New Brunswick, Cumberland County VI.

NOTIDOBIA Steph.

N. pyraloides Wlk. Pennsylvania to Georgia.

BRACHYCENTRUS Curt.

B. incanus Hagen. New Brunswick IV, 21, IX, 18.

MORMONIA Steph.

M. togata Hagen. Canada to Virginia.

HELICOPSYCHE Bremi.

H. borealis Hagen. New Brunswick IX, 18.

BERÆA Steph.

B. nigrita Banks. Clementon, VIII (Jn).

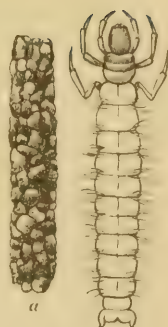


Fig. 29.—Larva of Caddice fly and its case: enlarged.

Family RHYACOPHILIDÆ.**RHYACOPHILA** Pict.

R. torva Hagen. Del. Water Gap VII (Jn).

CHIMARRHA Leach.

C. aterrima Hagen. Canada to Virginia.

Family LEPTOCERIDÆ.**LEPTOCERUS** Leach.

L. mentiens Wlk. New Brunswick VIII.

L. transversus Hagen. Washington, D. C., common.

SETODES Ramb.

S. albida Wlk. Canada to Virginia.

S. exquisita Wlk. New Brunswick IX, 18.

S. flaveolata Hagen. New Brunswick.

S. incerta Wlk. New Brunswick IX, 18.

S. resurgens Wlk. Canada to Virginia.

S. uwarowii Kol.=*candida* Hagen. Riverton VII (Jn).

TRIÆNODES McLach.

T. ignita Wlk. Riverton VII (Jn), New Brunswick IX, 18.

T. venusta Banks. New Brunswick IX, 18.

MYSTACIDES Pict.

M. nigra Linn. New Brunswick and probably throughout the State.

ÆCETINA Banks.

Æ. avara Banks. New Brunswick IX, 19, common.

Æ. incerta Wlk. Westville VI, Riverton VII (Jn).

Æ. guttulata Banks. New Brunswick IX, 18.

Æ. parvula Banks. New Brunswick IX, 18.

Æ. fumosa Banks. Staten Island, VI (Ds).

Family HYDROPSYCHIDÆ.

MACRONEMA Pict.

M. zebratum Hagen. Canada to Virginia.

HYDROPSYCHE Pict.

H. alternans Wlk.=*morosa* Hagen. Caldwell (Cr), common.

H. alternata Hagen. Riverton, VII (Jn).

H. phalerata Hagen. New Brunswick VII.

H. scalaris Hagen. New Brunswick.

H. sordida Hagen. Canada to Virginia.

H. n. sp. Banks. New Brunswick VI.

PHILOPOTAMUS Leach.

P. distinctus Wlk. Caldwell, rare (Cr).

POLYCENTROPUS Curt.

P. confusus Hagen. Staten Island VI (Ds), Jamesburg V, Prospertown, V.

P. lucidus Hagen. New York and Pennsylvania.

PSYCHOMIA Latr.

P. flavida Hagen. Canada to Virginia.

ORDER ODONATA.

The *Odonata* or dragon flies are not of economic importance, none of them feeding upon growing vegetation. The adults are all more or less predatory, feeding largely upon mosquitoes and other small flies, whence they are termed "mosquito hawks." Their long, slender bodies, narrow, long net-veined wings, large head, with prominent immense eyes, give them a fierce appearance which has earned for them the names "snake doctor," "devil's darning-needles," &c., as well as a crop of fables concerning their destructive powers. As a matter of fact they are quite harmless, incapable not only of stinging or pinching, but even, because of the peculiar mouth structure, of biting except on a projecting point or edge. They fly during the day, generally along water courses or over ponds, ditches or other bodies of water, and they may be frequently observed copulating and darting at intervals to the surface to enable the female to drop a load of eggs.

Some species crawl down reeds or grasses beneath the surface of the water to oviposit. The larvæ live on the bottom of creeks, brooks or ponds, in mud or among vegetation and they feed upon whatever smaller soft-bodied creatures they can get hold of. They are sluggish in general habit and enabled to get their prey by means of a peculiar hinged mouth-structure.

The insects are of the greatest interest in all stages; but, as already noted, they are not in any way of importance to the farmer. They are certainly not injurious; but their predatory habits are such that they are not markedly beneficial or useful, either.



Fig. 30.—The transformation of a dragon fly. 1, larva with its jaws extended; 2, pupa shell from which the adult has issued; 3, active pupa capturing its prey; 4, pupa on stalk, ready to transform; 5, adult dragon fly.

It has been proposed to cultivate some of the species for the purpose of reducing the mosquito pest; but this left out of consideration the fact that dragon flies are active during the bright sunshine when the mosquito does not fly unless disturbed, while at night, when the mosquito is most active, the dragon fly is at rest.

Dr. Philip P. Calvert, of the University of Pennsylvania, has made a special study of this family and has courteously determined and arranged the New Jersey material. He should be credited with the following list in its entirety, and writes as follows in explanation.

ORDER ODONATA.

BY PHILIP P. CALVERT.

At Prof. Smith's request I have undertaken to prepare the list of insects of this order hitherto found in New Jersey. In doing so, I have included only those species of which I have seen specimens from the State, or for which only the best authority (Dr. Hagen or Baron de Selys) exists. The material upon which this list is based has been collected or furnished by the following gentlemen, for whose courtesy and aid I here return thanks: Messrs. S. F. Aaron, N. Banks, W. Beutenmuller, W. T. Davis, G. M. Greene, S. F. Gross, H. Hornig, C. W. Johnson, S. T. Kemp, P. Laurent, P. Nell, L. Riederer, C. F. Seiss, H. Skinner, J. B. Smith, H. V. Viereck, H. W. Wenzel. Most of the records by Mr. Crane, of Caldwell, from the first edition of this catalogue have also been included, together with my own record (C), and data on some specimens in the collection of the Academy of Natural Sciences of Philadelphia (A. N. S.). The abbreviations in parentheses are used as in the other portions of the list to indicate the source of information for each locality cited.

The localities under each specific name are arranged in geographical order from north to south. Mr. Davis' list of the species of Staten Island has been included for obvious reasons. The arrangement of the species is the same as that of my "Catalogue of the Odonata of the Vicinity of Philadelphia" (1893), in which most of those following are described. The total number is here given as 90, but additional search will no doubt increase it to beyond 100.

Family AGRIONIDÆ.

Sub-family CALOPTERYGINÆ.

CALOPTERYX Leach.

C. maculata Beauv. Caldwell (Cr), Staten Island, VII, VIII (Ds), Orange Mountains, Milford (Bt), Jamesburg (Sm), Toms River (Bt), Barnegat, V, 31, (C), Riverton, V, 30, (G), Kirkwood, VII, 16, Albion, VI, 1,

Ancora, V, 29, Woodstown, V, 29, (C), Haddonfield, VIII (R), Anglesea, VII, 16, (H), Almonesson VII, 17, North branch, Big Timber Creek VII, 29, Raccoon Creek, Mullica Hill VII, 3 (C).

C. apicalis Burm. Toms River (Bt). Mr. L. Riederer has kindly sent me specimens of both sexes, taken at the same place: Raccoon Creek, Mullica Hill VIII, 3, not common, Patcong Creek VIII, 25 (C).

I have not seen the specimens cited as *C. virginica* Dru, Caldwell, by Mr Crane, p. 456 of the first edition of this Catalogue. *C. virginica* is now regarded as synonymous with *C. æquabilis* Say and *C. hudsonica* Hag, and is best omitted here until additional specimens are forthcoming.

HETÆERINA Hagen.

H. americana Fabr. Dover, VI (Jn), Cranberry bogs, Southern New Jersey (Sm), Haddonfield VIII (R), Patcong Creek VIII, 25 (C). This species must also occur elsewhere in the State, but I have found no other specimens or records.

Sub-family AGRIONINÆ.

LESTES Leach.

L. congener Hag. Staten Island. September, (Ds).

L. unguiculatus Hag. Bergen Hill (Hag) Four Corners, Staten Island, ovipositing VII, 15, (Ds), Lucaston, VII, 16, (C). Anglesea VI, 19 (Lt), VIII, 21 (Sm).

L. forcipata Ramb. Bergen Hill (Hagen, as *hamata*), Staten Island, IV, 30 V, VI, VIII (Ds); one male having its superior appendages like *forcipata*, its inferior appendages as in *disjuncta* Selys, "N. J." May 8 (A N S); Lahaway, VII, 7, Jamesburg, VI, 4 (Sm), Quinton VIII, 27 (C).

L. rectangularis Say. Little Falls VIII, 12, Staten Island, VI, VII, VIII, Manchester IX (Ds) Jamesburg (Sm). Riverton (V) Haddonfield VIII, Kirkwood, Lucaston, VI, 16, (C). Anglesea, V, 30, VI, 25 (Lt), VI, 20, IX, 10 (Sm), Cape May (Sk).

L. vigilax Selys. Morris Co., VII, 10, (Jn), Manchester IX (Ds), Clayton, VIII, 29, Hammonton Lake VIII, 23 in cop., Gibbs Hill pond VIII, 27, Patcong Creek in cop. VIII, 25, West Creek Pond, Eldora VIII, 26 (C), Haddonfield VIII, Clementon IX, 6, Manahawken VIII, Tuckerton VIII (R).

L. inequalis Walsh. Morris County, VII, 10, (Jn). Staten Island, VII (Ds), Kirkwood, VI, 16, (C).

ARGIA Ramb

A. putrida Hag. Normanock, VII, 23, Little Falls VII, 8 (Ds), Del Water Gap, VII, 7, 9, (Jn), Dunnfield Creek, VII, 14, (C), Newark, Gloucester County, VII, 15, (Sm).

- A. violacea* Hag. Newfoundland, Normanock, VII, Staten Island, VII, VIII (Ds), Jamesburg, VIII, 2 (Sm), Kirkwood, VI, 16, Ancora, VI, 29, (C), Gloucester Co., VII, 15 (Sm), Formosa Bog, VII, 23, North Branch Big Timber Creek VII, 29, Greenloch VII, 29, Mullica Hill VIII, 3, Harris Hill Pond VIII, 27, Patcong Creek, VIII, 25 (C). Haddonfield VIII, Clementon IX, 6 (R).
- A. translata* Selys. Hanks Pond, near Newfoundland, Sept., 1899 (Ds). Four males beginning to be pruinose. They closely resemble individuals from Mexico, Texas and Arkansas referred by me to this species. *Translata* was described from Porto Cabello, Venezuela, but I have no Venezuelan specimens for comparison. These two males show some differences in detail from the Mexican and Texan individuals and may prove to be not *translata*; but they are at least closely allied, and are different from any *Argia* known to me from the northern U. S.
- A. tibialis* Hag. Atco, IX, 4, 6 (H), "N. J.," VII, 4 (A N S).
- A. apicalis* Say. Staten Island (Ds). Almonesson VII, 17, Greenloch VII, 29, in copula, Mullica Hill VIII, 3 (C), Haddonfield VIII (R).
- A. bipunctulata* Hag. New foundland VI, 4 (Ds), Haddonfield VIII (R), Atco, VII, 12 (N), Berlin, VII, 17, Albion VI, 1 (C).

NEHALENNIA Selys.

- N. irene* Hag. Berlin, VII, 17, '93 (C).
- N. posita* Hag. Staten Island, VI, VII, VIII (Ds), Barnegat, V, 30, 31, Kirkwood, V, 25, VI, 16, Albion, VI, 1 (C), Westville, VII, 1 (L), Haddonfield, VIII, Clementon, IX, 6, Ocean Co., VIII (R), Woodstown, V, 28 (C), Cape May, V, 30 (Ss), Almonesson, VII, 17, Greenloch, VII, 29, Mullica Hill, VIII, 3, Hammonton Lake, VIII, 23, Alloway, VIII, 28, Patcong Creek, VIII, 25 (C).

AMPHIAGRION Selys.

- A. saucium* Burm. Near Dunker Pond, Passaic Co., VII, Staten Island, VI, VIII (Ds), Jamesburg, VII, 4 (Sm), Riverton, V, 30 (G), Clementon, V, 16, Westville, VI, 6 (Jn), Woodstown, V, 28 (C).

ENALLAGMA Charp.

- E. durum* Hag. Westville, VIII, 28, '98 (W), also specimens in Wagner Institute and A. N. S. marked "N J", Alloway VIII 28, Bargaintown VIII, 24, Petersburg VIII, 25 (C), Ocean Co. VIII (R).
- E. doubledayi* Hag. One male Mus. Comp. Zool., labelled "N. J. Aug. P. R. Uhler," agrees exactly with Hagen's type except for its smaller size. Prof. Uhler has written, Aug. 1, 1899, "I remember that *Enallagma doubledayi* was caught while flying about the border of the mill-pond at Gloucester, near Egg Harbor River. I can never forget the delight I experienced in capturing the first specimen of this tropical form which I had previously received from Florida. They were not numerous like *A. pryorum* [= *pictum* Morse, see below], but I caught half a dozen of them within a radius of about half a mile." (C). Ocean Co., Manahawken or Tuckerton VIII, 1899, three males (R).

- E. civile* Hag. New Foundland, VII, Staten Island, VI, VIII, IX (Ds), Westville, VIII, 28 (W), Kirkwood, V, 25, mostly male, Clayton, VIII, 29, Ocean City, VIII, 26, 27, Seaville, VII, 12, Sea Isle City, VII 25-VIII, 23 (Lt C), Anglesea, VIII, 22 (Lt), IX, 4, (Sm), Mullica Hill, VIII, 3, in copula, at millpond, but not in the narrower creek itself, Bargaintown, VIII, 24, Petersburg, VIII, 25 (C), Haddonfield, VIII, Ocean Co., VIII (R).
- E. carunculatum* Morse. New Foundland, July, '97 (Ds).
- E. aspersum* Hag. Bergen Hill (Hag), Staten Island, VI, VII, VIII (Ds), Haddonfield, VIII (R), Seaville, VII, 12, Cape May, V, 30 (Sk).
- E. traviatum* Selys. Almonesson, VII, 17, one female (C).
- E. geminatum* Kellicott. Jamesburg, VII, 4 (Lt), Kirkwood, V, 25, mostly male, VI, 16, in copula, Almonesson, VII, 17, Clementon, VII, 22, Mullica Hill, VIII, 3, West Creek Pond, Eldora, VIII, 26 (C).
- E. divagans* Selys. Kirkwood, June 16, '98 (C).
- E. exsulans* Hag. Three States Point, VII, 21 (C), Dela. Water Gap, VII, 12 (Jn), Jamesburg (Sm), Patcong Creek, VIII, 25, Mullica Hill, VIII, 3, in copula, in the narrower parts of Raccoon Creek, but not at the mill-pond—compare *civile* (C).
- E. signatum* Hag. Staten Island, VI, VIII (Ds), Kirkwood and Lucaston, VI, 16, in copula, Haddonfield, VIII, Gibbs Hill Pond, VIII, 27, Harris Hill Pond, VIII, 27 (C), Westville, VI, 6 (V), VII, 10 (Lt), VIII, 28 (W), Almonesson, VII, 17, *in cop*, Clementon, VII, 22, Greenloch, Good Intent, VII, 29, Mullica Hill, VIII, 3, *in cop*, Raccoon Creek and mill-pond (C).
- E. pollutum* Hag. Clementon, VII, 22, one male taken late afternoon (C).
- E. pictum* Morse. Tuckerton, VIII (R), Hammonton Lake, VIII, 23 (C), Gibbs Hill Pond, VIII, 27, Patcong Creek, VIII, 25, West Creek Pond, Eldora, VIII, 26, *in cop*., Clayton, VIII, 29, May's Landing, VIII, 25, *in cop*., Clementon, VII, 22, *in cop*. Three males and one female in the Museum of Comparative Zoology, Cambridge, labelled "N. J.," and some "Aug.," "1860," "*A. pyropum* Uhler," are of this species, but the name was never published, I believe (C).

ISCHNURA Charp.

- I. verticalis* Say. Normanock, VII, Newfoundland, V (Ds), Bergen Hill (Hagen, erroneously as *Ramburii*), Staten Island, V to VIII (Ds), New Brunswick, Jamesburg, VIII, 10, Lahaway, VII, 5 (Sm), Barnegat, V, 30, 31 (C), Riverton, V, 30 (G), Haddonfield, VIII, Kirkwood, V, 25, Albion, VI, 1, Lindenwold, VI, 16, Hammonton, VII, 23 (C), Clementon, V, 16 (Jn), VII, 22, IX, 6, Ancora, V, 29, ovipositing (C), Westville, VI, 1 (Lt), VII, 15 (C), VIII, 28 (W), Millville, VIII, 28, Ocean View, VIII, 25 (C), Ocean Co., VIII (R), Cape May, V, 30 (Sk), Greenloch, Good Intent, VII, 29, Mullica Hill, VIII, 3, Bridgeton, VIII, 27 (C).
- I. kellicotti* Williamson. Clementon, IX, 22, Hammonton Lake, VIII, 23, Alloway, VIII, 28, Bridgeton, VIII, 27, Patcong Creek, VIII, 25, West Creek Pond, Eldora, VIII, 26, Millville, VIII, 28, '98 (C), Tuckerton, VIII (R).

- I. ramburii* Selys. Staten Island, IX, X (Ds), Ocean Co., VIII (R), Clay-ton, VIII, 29, Bridgeton, VIII, 27, Millville, VIII, 28, Bargaintown, VIII, 24, West Creek Landing, Eldora, VIII, 26, Ocean City, VIII, 26, 27, Petersburg, VII, 23 (C), Sea Isle City, VII, 2 to VIII, 27, ovipositing VII, 2 (C, Lt).

ANOMALAGRION Selys.

- A. hastatum* Say. Staten Island, VII, 9, IX. Normanock, VII (Ds), Bergen Hill (Hag.), Manahawken (R), Haddonfield, VIII, Barnegat, V, 30, 31, Petersburg, VIII, 30, Harris Hill Pond, VIII, 27 (C), Anglesea, VII, 22 (Sm), VIII, 19 (Ss), IX, 5 (W).

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Family ÆSCHNIDÆ.

Sub-family GOMPHINÆ.

HAGENIUS Selys.

- H. brevistylus* Selys. Newfoundland, one female, July, '97 (Ds).

OPHIOGOMPHUS Selys.

- O. rupinsulensis* Walsh. Dover, (Jn).

GOMPHUS Leach.

- G. spicatus* Selys. Newfoundland, July (Ds), Caldwell (Cr, his specimens not seen by me).
G. exilis Selys. Little Falls, V, Newfoundland, VII, Staten Island, V-VII (Ds), Kirkwood and Lucaston, VII, 16, *in cop.* (C), Clementon, V, 30 (Jn), Ancora, V, 29, ovipositing (C), Cape May, V, 30 (Sk).
G. villosipes Selys. Staten Island, June (Ds).

DROMOGOMPHUS Selys.

- D. spinosus* Selys. Sparta, VII, Newfoundland, VI (Ds), Dunnfield Creek, VII, 14 (C).

Not having seen the *Gomphus armatus* of the first edition of this Catalogue, I believe it best to omit it here.

Sub-family CORDULEGASTERINÆ.

CORDULEGASTER Leach.

- C. maculatus* Selys. Richmond, Staten Island, V, 30, '90 (Ds).

Sub-family *ÆSCHNINÆ*.*EPIÆSCHNA* Selys.

- E. heros* Fabr. Caldwell (Cr), Staten Island, V-VIII, ovipositing VII, 28 (Ds), New Brunswick, VI, 1, 6 (Sm), Atlantic City, IX, 15 (Ss), Ocean City and mainland opposite, VIII, 26, 27, very abundant, Ocean View, VIII, 25, Sea Isle City, VI, 24, VII, 23, VIII, 13, 20, IX, 1 (C), Anglesea, VII, 8 (Lt), cast upon beach VII, 5 (H).

BOYERIA McLach.

- B. vinosa* Say. Sparta, VII, Newfoundland, VII, IX (Ds), Caldwell (Cr), Staten Island, VII (Ds), Lakewood (Sm), Mt. Holly, VII, 4, by S. F. Aaron (A N S), Clementon, by S. F. Gross.

BASIÆSCHNA Selys

- B. janata* Say. Staten Island, one male, V, 2 (Ds), Medford, one specimen, '92, by N. Banks (*in litt*).

GOMPHÆSCHNA Selys.

- G. furcillata* Say. Manchester, one female, June '98 (Ds).
var. *antelope* Calvert. Newfoundland, VI, 22 (Ds), Clementon by S. F. Gross, Sea Isle City, one dead, broken female, washed upon beach VI, 25, '92 (C).

ÆSCHNA Fabr.

- A. juncea* L., var. *verticalis* Hag. Staten Island, VI, IX, X (Ds).
A. clepsydra Say. Newfoundland, IX (Ds), Dunnfield Creek, VII, 14 (C).
A. constricta Say. Normanock, VII (Ds), Dunnfield Creek VII, 14 (C), Caldwell (Cr), Staten Island, VI, IX, X (Ds), Haddonfield, IX (R), Anglesea, IX, 6 (Sm).
A. grandis L. Bergen Hill, one male (Hag). The record of this species from Ocean Co., in the first edition, p. 458, is incorrect. The species is European and not known from N. America other than by Hagen's specimen, supposed to have been introduced by a vessel.

ANAX Leach.

- A. junius* Drury. Caldwell (Cr), Staten Island, IV, 9, IX, *in cop.*, V, 5 (Ds), Ocean Co., Merchantville, IX, 19 (Sm), Haddonfield VIII (R), Ancora, V, 29, Westville, IV, 21, Kirkwood, V, 25, Albion, VI, 1, Mt. Pleasant, VII, 23, Clementon, VII, 22, *in cop.*, Seaville, VII, 12, Patcong Creek, VIII, 25 (C), Anglesea, IX, 5 (Lt).
A. longipes Hag. Staten Island, Clove Valley, VI, 5, and VIII, 9, Orange (Ds).

Family LIBELLULIDÆ.**Sub-family CORDULINÆ.****DIDYMOPS Ramb.**

- D. transversa* Say. Little Falls, V, Newfoundland, VI, VII (Ds), New Brunswick (Sm), Mt. Holly, V, 13, by E. M. Aaron (A N S), Riverton, IV, 23 (Jn), Woodbury. IV, 29 (Kp).

MACROMIA Ramb.

- M. illinoensis* Walsh. Newfoundland, VII, Echo Lake, VII, 2, (Ds), Dela. Water Gap, VII, 9 (Jn).

EPICORDULIA Selys.

- E. princeps* Hag. Newfoundland, VI, VII (Ds), Almonesson, VII, 17 (C).

TETRAGONEURIA Hagen.

- T. cynosura* Say. Newfoundland, VI, VII, Staten Island, V, VII, Manchester, VI (Ds), Clementon, V, 16 (Jn).
T. semiaquea Burm. Kirkwood, VI, 16 (C), Clementon, V, 16 (Jn), V, 22 (G), Anglesea, V, 11 (Lt).

NEUROCORDULIA Selys.

- N. uhleri* Selys. "Deux femelles (coll. Uhler), de New Jersey," Selys, Bull. Acad. Belg. (2) XXXI, p. 275, 1871.
N. obsoleta Say. Delaware Water Gap, VII, 10, one female (Jn).

SOMATOCHLORA Selys.

- S. lepida* Hagen. Atco, VI, 18, '93 (Jn).
S. libera Selys. Normanock, VII 23, '94 (Ds).
S. filosa Hag. Petersburg, one male, VIII, 30, '92 (C), Cape May Co., IX, 20 (Sm). Mr. C. C. Adams sends me the following note: "In Dr Hagen's copy of Syn. des Cordulines, '71, p. 53, in pencil, under *Epithea filosa* Hag., Dr. H. has written on bottom of page 'N. J. male given to De Selys.'"
S. sp. near *forcipata* Scud. Formosa Bog, Aug. 30, '92, one male (C).
S. tenebrosa Say. Jamesburg, VII, 4, '91 (Ds), Clementon, IX, 6, '99 (R), "New Jersey, June" (Hagen, 1875).

Sub-family LIBELLULINÆ.**PANTALA Hagen.**

- P. flavescens* Fabr. Staten Island, July-Sept. (Ds).
P. hymenaea Say. Sea Isle City, VIII, 15, '97 (Lt).

TRAMEA Hagen.

- T. carolina* L. Bergen Hill (Hagen), Staten Island, V-IX, ovipositing, VII, 15 (Ds), Toms River (Bt), Ocean Co., (Sm), Atco (Jn), Albion, VI, 1, ovipositing, Ocean City, VIII, 26, 27, Mt. Pleasant, VII, 23, VIII, 30, and Ocean View, VIII, 25, Sea Isle City, VII, 8 (C), Anglesea, VI, 11 (Lt), Cape May, VIII (A N S).
- T. lacerata* Hagen. Staten Island, May-Sept., (Ds), Haddonfield, VIII, (R), Ocean Co. (Sm).

LIBELLULA Linn.

- L. basalis* Say. Sparta, VII (Ds), Caldwell (Cr), Staten Island, VI, VII (Ds), Riverton, VII (Jn), Haddonfield, VIII (R), Westville, VII, 11, 12 (Lt), VII, 15, Mullica Hill, VIII, 3, (C).
- L. auripennis* Burm. Staten Island, V, VII (Ds), Tuckahoe, VII, 21, Petersburg, VII, 23, Ocean View, VIII, 25, Seaville, VIII, 30, Sea Isle City, VII, 10, VIII, 20—all '92 (C).
- L. flavida* Rambur (not Hagen).* New Jersey (Hagen); "rare" (Ms. note of Mr. Beutenmuller's communicated by Prof. Smith; I have a record of an individual taken at Cape May, May 30, '90, by Dr. Skinner, but cannot now find the specimen: Haddonfield VIII, 1899, four specimens (R).
- L. cyanea* Fabr. Ft. Lee, VI (Bt), Staten Island, VI-VIII (Ds), Lahaway, VII, 3, Jamesburg, VI, 16 (Sm), VII, 4 (Banks, Lt), Ocean Co. (Sm), Kirkwood, VI, 16 (C), Haddonfield, VIII (R), Westville, VII, 2 (Lt), VII, 15, Tuckahoe, VII, 22, and Seaville, VII, 12 (C), Cape May, V, 30 (Sk).
- L. axillena* Westw. var. *vibrans* Fabr.? Staten Island, VII, VIII (Ds), "New Jersey," one male, by T. R. Peale (A N S), North Branch Big Timber Creek VII, 29 (C).
- L. axillena* Westw. var. *incesta* Hag. Normanock, VII, 23, Staten Island, VII, VIII (Ds), Haddonfield, VIII (R), Millville, VIII, 28, Almonesson, VII, 17, Clementon, VII, 22, IX, 6, Greenloch, VII, 29, Mullica Hill, VIII, 3, Patcong Creek, VIII, 25, West Creek Pond, Eldora, VIII, 26 (C).
- L. exusta* Say. Newfoundland, VI, VII (Ds), Jamesburg, V, VI, 16 (Sm), Manchester, VI (Ds), Lucaston, VI, 16 (C), Clementon, V, 10, 16 (Lt, Jn), Atco, VI, 4 (Jn), VI, 22 (A N S), Ancora, V, 29, ovipositing, Albion, VI, 1 (C), Westville, VII, 1 (Lt).
- L. quadrimaculata* L. Arlington, Staten Island, V, 11, '89, VI, 19, '93 (Ds), Atco, VI, 18, 22, '93 (Jn).
- L. semifasciata* Burm. Ft. Lee, VI (Bt), Newark (Sm), Staten Island, IV, 25, IX (Ds), Ocean Co., V, 28 (Sm), Haddonfield, VIII (R), Ancora, V, 29 (C), Westville, VII, 11 (Lt), Albion, VI, 1, Tuckahoe, VII, 2, 22, Formosa Bog, VII, 23, Petersburg, VIII, 30, Sea Isle City, VII, 4, VIII, 12—all '92 (C), Anglesea, V, 11, VI, 18, 19 (Lt).

* I have examined Rambur's presumed type of *flavida* at Oxford, England. It is identical with *plumbea* Uhler and therefore different from *flavida* Hagen, which latter will require a new name. P. P. C

L. pulchella Drury. Caldwell (Cr), Staten Island, V-IX (Ds), Albion, VI, 1, Kirkwood, VI, 16, and Atco, VIII, 24 (C), Clementon, VI, 3 (Lt), Haddonfield, VIII (R), Ancora, V, 29 (C), Westville, VI, 1, VII, 2 (Lt), VII, 15, Millville, VIII, 28, Mallica Hill, VIII, 3, Ocean City, VIII, 26, 27, Bargaintown, VIII, 24, Tuckahoe, VII, 21, Mt. Pleasant, VII, 23, Petersburg, VIII, 30, West Creek Landing, Eldora, VIII, 26, Sea Isle City, VII, 10, VIII, 13 (C), Anglesea, VI, 25 (Lt), VII, 5, one female cast upon beach (H), Cape May, V, 30 (Sk).

PLATHEMIS Hagen.

P. trimaculata DeGeer. Caldwell (Cr), Staten Island, V-IX (Ds), Jamesburg, VII, 4, Ocean Co., V, 28 (Sm), Riverton, V, 30 (G), Smithville, V, 29, Kirkwood and Lindenwold, VI, 16, Atco, VIII, 24, Ancora, V, 29, (C), Haddonfield, VIII (R), Westville, VII, 2 (Lt), Woodbury, V, 7 (Kp), Woodstown, V, 28 (C), Almonesson, VII, 17, Cape May (Sk).

MICRATHYRIA Kirby.

M. berenice Drury. Bergen Hill (Hag), Staten Island, V-VIII (Ds), Sandy Hook, VII-VIII (Bt), Atlantic City, VII, 1 (A N S), Beach Haven (R), Ocean City, VIII, 26, 27, Sea Isle City, VI, 23, VIII, 30, West Creek Landing, Eldora, VIII, 26 (C), Anglesea, VI, 13, VII, 16 (Lt, Sm), Cape May, V, 30 (Sk).

NANNOTHEMIS Brauer.

N. bella Uhler. Four Corners, Staten Island, VI and VII, Tom's River, VIII (Ds), Albion, VI, 1, both sexes abundant, Lucaston, VI, 16, *pruinose* males, Berlin, VII, 17, Seaville, VII, 21 (C).

CELITHEMIS Hagen.

C. ornata Rambur. Manchester, IX, Tom's River, VII, 15 (Ds), Clementon, VII, 22, IX, 6, Ocean View, VIII, 25, Indian Creek, VIII, 24, Patcong Creek, VIII, 24, West Creek Pond, Eldora, VIII, 26 (C).

C. elisa Hag. Bergen Hill (Hag), Staten Island, VI-VIII (Ds), Sandy Hook, VII, VIII (Bt), Haddonfield (R), Ocean Co. (Sm), Albion, VI, 1, Lucaston, VI, 16, Clementon (Cat. Phil Odon. p 261), Berlin, VII, 17, Seaville, VIII, 30 (C).

C. eponina Drury. Staten Island, V, VII (Ds), Tom's River, VIII (Bt), Haddonfield, VIII (R), Westville, VIII, 28 (W, Lt), VII, 15, Clementon, VII, 22, IX, 6, Ocean View, VIII, 25, Patcong Creek, VIII, 5, West Creek Pond, Eldora, VIII, 26 (C).

LEUCORHINIA Britt.

L. intacta Hagen. Normanock, VII, Newfoundland, VII, Staten Island V and VI (Ds), Albion, VI, 1 (C).

SYMPETRUM * Newn.

- S. rubicundulum* Say. Fort Lee and Snake Hill (Bt), Bergen Hill (Hag), Caldwell (Cr), Staten Island, VII-IX (Ds), Jamesburg, VII, 4 (Lt), VIII, 10 (Sm), Gloucester, VI, 24 (H), Lucaston, VI, 16 (C) Clementon, V, 15, VI, 24 (H), Westville, VII, 2 (Lt), Anglesea, VI, 25, VII, 5, 16 (Lt, H).
 var. *assimilata* Calvert. Westville, VII, 27 (N).
- S. obtrusum* Hagen. Staten Island, July (Ds).
- S. semicinctum* Say. Sparta, VII, Four Corners, Staten Island, VII, 15 (Ds), Shark River, VII, 12 (Jn).
- S. vicinum* Hagen. Bergen Hill (Hag), Staten Island, IX, X (Ds), New Brunswick, Ocean Co., X, 8 (Sm), Manahawken, VIII, Haddonfield, VIII (R), Clementon, IX, 6, Atco, VIII, 24 (C), IX, 2 (Lt), Westville, VII, 9 (Lt), Millville, VIII, 28, mainland opposite Ocean City, VIII, 26, Formosa Bog, VIII, 30, Ocean View, VIII, 25, Patcong Creek, VIII, 25 (C), Gloucester, Nov. 12, '99 (W).
- S. corruptum* Hagen. Eltingville, Staten Island, V, 27 (Ds).

PERITHEMIS Hagen.

- P. domitia* Drury. Staten Island, VI, VII (Ds), Jamesburg, VIII (Sm), Riverton, VII (Jn), Kirkwood, VI, 16 (C), Haddonfield, VIII (R), Gloucester Co., VII, 15 (Sm), Westville, VII, 2, 9 (Lt), VIII, 28 (W), VII, 15, Almonesson, VII, 17, Hammonton Lake, VIII, 23, Alloway, VIII, 28, Harris Hill, VIII, 27, Clementon, VII, 22, IX, 6, Greenloch, Good Intent, VII, 29, Mullica Hill, VIII, 3, abundant, West Creek Pond, Eldora, VIII, 26 (C).

MESOTHEMIS Hagen.

- M. simplicicollis* Say. Ft. Lee (Bt), Staten Island, VI, VIII (Ds), Ocean Grove (Cr), Jamesburg, VII, 4 (Lt, Sm, Banks), Ocean Co. (Sm), Albion, VI, 1, Kirkwood, Lindenwold, VI, 16, Atco, VIII, 24 (C), IX, 8 (Ss), Haddonfield, Ocean Co., VIII (R), Westville, VII, 1 (Lt), IX, 12 (V), Millville, VIII, 28, Bridgton, VIII, 27, Tuckahoe, VII, 21, Mt. Pleasant, VII, 23, Ocean View, VIII, 25, Patcong Creek, VIII, 25, Seaville, VII, 12, ovipositing, VIII, 30 (C), Cape May, V, 30 (Sk), VIII (A N S).

PACHYDIPLAX Brauer.

- P. longipennis* Burm. Staten Island, VI, IX (Ds), Haddonfield, VIII (R), Lindenwold, VII, 16, Atco, VIII, 24 (C), Westville, VI, 1, 9 (Lt), Albion, VI, 1, Millville, VIII, 28 (C), Ocean View, VIII, 25, Seaville, VII, 12, Clementon, VII, 22, Greenloch, VII, 29, Mullica Hill, VIII, 3, Bridgton, VIII, 27 (C), Anglesea, IX, 5 (Lt), Cape May, V, 30 (Sk).

* *Sympetrum* having priority over *Diplax* and having been adopted by most writers on this group, the example of the majority is here followed. P. P. C.

ORDER THYSANOPTERA.

The insects of this order are commonly known as "Thrips," and often cause severe injury to growing plants. They are of very small size, very slender, somewhat fusiform, with very delicate slender fringed wings which are laid flat upon the back when at rest and are not even visible to the ordinary observer without a lens.

The mouth parts are made up of a number of slender lancets, only the points of which protrude beyond the mouth opening. With these they scrape the surface of the leaf or plant and exhaust the cell beneath, leaving a yellow spot. Onions are frequently turned almost white when badly infested, and cabbage may be completely devitalized. "Silver-top" on grasses is one of the effects, and for several years past injury has been caused on nursery peaches in some parts of the State; growth being checked and the tree dwarfed or crippled.

Not all species are harmful, however, some occurring in flowers and others in such situations as to make it reasonably certain that they are predatory. Yet, as a whole, this little order must be considered as injurious.

As to remedial measures, it is difficult to make recommendations save the impossible one of getting abundant and seasonable rains. The insects thrive best in a dry time and may be completely checked in their full-tide by a heavy rain, especially if at all cold. Any contact poison will kill them, even if considerably diluted, and quantity of mixture rather than strength is important. Cold water alone will be quite effective if plenty of it is at hand.

Practically no collecting has been done in New Jersey in this order, though the insects merit much more attention than they have received, from their economic importance as well as from their interesting structures.

The present list I owe to the kindness of Mr. Theodore Pergande, of the U. S. Department of Agriculture, and it is based entirely upon his knowledge of the general distribution. All the notes are by Mr. Pergande except that charging *T. tritici* with injuring nursery peaches and those that are especially marked (Sm).

Family THRIPIDÆ.

COLEOTHRIPS Halid.

C. trifasciata Fitch. Infests grain and grasses.

CHIROTHRIPS Halid.

C. antennatus Osb. Infests grasses.

LIMOTHRIPS Halid.

L. cerealium Halid. Infests grain and grasses.

HELIOTHRIPS Halid.

H. dracanæ Heeger. On hot-house plants.

H. hæmorrhoidalis Bouché. On hot-house plants.

THRIPS Linn.

T. sex-maculatus Pergande. Occurs on leaves of various plants.

T. tabaci Lindem. Infests cabbage, onion and other vegetables. A serious pest locally and seasonally, especially on onions (Sm).

T. tritici Fitch. On grain, grasses, and in flowers; also in tips of nursery peach trees, sometimes causing serious injury.

PHLÆOTHRIPS Halid.

P. caryæ Fitch. Occurs on hickory.

P. mali Fitch. Found on leaves of apple.

P. nigra Osb. Infests clover.

P. phylloxera Riley. Occurs in galls of *Phylloxera* and is said to feed on its inhabitants (Sm).

ORDER PARASITICA.

This order, or sub-order as some prefer to consider it, contains the sucking lice, parasitic upon warm-blooded animals generally, other than birds.

They never become winged, have practically no transformations, the body is more or less flattened and the feet are scansorial or fitted for climbing. The eggs are usually attached to the hair among which they feed.



Fig. 31
Body louse;
greatly enlarged.

Three species attack man, the "crab-louse," for which mercurial ointment must be applied thoroughly in the infested regions, the "body louse," for which mercurial ointment must be applied in the seams of the infested clothing if that cannot be discarded or steamed, and the "head louse" for which a fine-tooth comb and a thorough rubbing with vaseline or some other greasy pomade is the best remedy.

On animals the methods suggested for the biting lice may be employed.

Family PEDICULIDÆ.

PHTHIRIUS Leach.

P. inguinalis Leach. "The Crab Louse"; occurs in the arm pits and pubic regions of man and woman.

PEDICULUS Linn.

P. capitis DeGeer. The common "head-louse" of man.

P. vestimenti Leach. The "body louse", "gray back" or "clothes louse."



Fig 32.—Beak of a louse, extended, showing blood globules passing between the lancets and the anchor hooks at base; very much enlarged.

HÆMATOPINUS Leach.

- H. piliferus* Burm. Sucking louse of the dog.
H. eurysternus Nitzsch. The "short-nosed" ox-louse.
H. vituli Linn. The "long-nosed" ox-louse.
H. urius Nitzsch. The "Hog-louse".

Other species of these lice occur on mice, squirrels and other animals found in the State ; but these have not been collected.

ORDER HOMOPTERA.

This ordinal term is employed for those *Rhyngota* in which the two pairs of wings are either similar in texture, as in the plant-lice and Cicada, or the primaries are of the same texture throughout, though they may be different from that of the secondaries, as in the leaf-hoppers.

The mouth parts are composed of four lancets, of which two are usually grown together, concealed in a jointed beak, except in the *Coccidæ* or scale insects. Usually the base of the beak is on the under side of the head, well back, and its point is directed obliquely backward so that it rests between the haunches of the front legs.

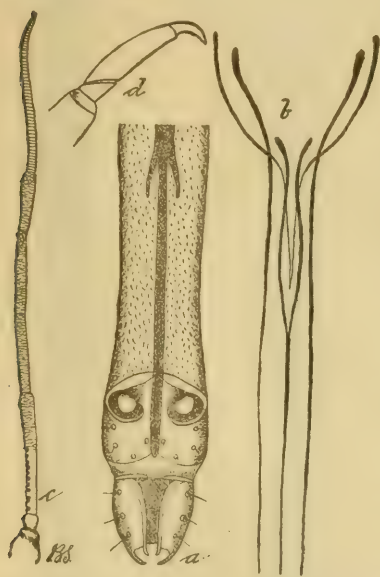


Fig. 33.—Mouth structure of a plant louse: *a*, beak; *b*, the lancets; *c*, tarsus: greatly enlarged.

All the species are plant-feeders, piercing the tissue by means of the lancets and exhausting the cells beneath. They are, therefore, of importance to the Agriculturist, and, as a matter of fact, some of our most destructive species and those most difficult to deal with belong to this order.

In a general way the transformations or metamorphoses are incomplete, but the life histories of the species are often involved and some are distinctly unique. Therefore no general recommendations for treatment can be given under this head save that stomach poisons are never useful and that contact poisons must be in all cases resorted to.

There is no complete list or catalogue of the order published and the collections are incomplete, few collectors taking them even incidentally; hence the material at hand has been scant and has been turned over to Prof. Herbert Osborn, of the Ohio State University, who is responsible for the general arrangement, and to whom all notes not otherwise bracketed must

be credited. All the economic suggestions, notes on life histories and recommendations for treatment are mine.

In the family *Aphididæ* assistance has been received from Mr. Theo. Pergande, of Washington, D. C., and in the *Coccidæ* Prof. T. D. A. Cockerell, of Mesilla Park, N. M., has given useful suggestions. Prof. Osborn writes as follows:

"This list, embracing the Homopterous fauna of New Jersey, is based, primarily, on specimens collected in the State and many of them examined by myself. Some are entered on the authority of Prof. P. R. Uhler, Mr. E. P. Van Duzee or others credited in the record for each species. Usually a specified locality is cited. Species recorded from the vicinity of New York City or

Philadelphia must be considered as belonging to the New Jersey fauna, as they will certainly be found within the State with proper collecting, and in fact specimens credited to these may in some cases have actually been captured on New Jersey soil. Still, none of those are given for N. J., except where known to have been collected at some point in the State."

"Other species will certainly be found, especially in *Jassidæ*, *Fulgoridæ*, *Aphididæ* and *Coccidæ*."

Family CICADIDÆ.

Large species with transparent wings, occurring on shrubs and trees, the males making a shrilling sound during the day. Includes the "Harvest flies" and "17-year locust" as common species.

In the adult stage they feed very little or not at all, the larvæ living from 1 to 16 years underground on the roots of trees, growing very slowly and doing no appreciable harm.

Eggs are laid in slits made in trunks, branches or twigs of shrubs and trees, and this sometimes causes serious injury on young or nursery trees. It is good policy not to set an orchard the year a large brood of the periodical Cicada is expected, nor indeed the year before. If planting must be done, do no pruning, that the insects may find plenty of twigs in which to oviposit, and these can be cut off after the insects disappear and the tree shaped up.

TETTIGEA Am. et Serv.

T. hieroglyphica Say. Anglesea, VI (Sk, Sm), Lahaway, Lakewood: oviposits in Cedar (Sm).

♂ TIBICEN Latr.

C. septendecim Linn. "Seventeen year Locust," or "Periodical Cicada": at intervals in all parts of the State. There are four distinct broods known in New Jersey, appearing during the last days of May and continuing to the early days of July; a list of the broods has been published in the bulletins and reports of the College Experiment Station.



Fig. 34.—Egg punctures made by the Periodical Cicada, the twig broken at *a*.



Fig. 35.—The Periodical Cicada, *Tibicen septendecim*: *a*, pupa, ready to emerge; *b*, pupa skin from which adult has emerged; *c*, adult; *d*, cavities to receive eggs; *e*, eggs, enlarged.

- T. rimosa* Say. New York and westward to Rocky Mts.; represented by varieties, some of which probably occur in New Jersey.
- T. striatipes* Hald. Sure to occur in New Jersey according to Ashmead, but not yet actually taken: Mr. Woodworth makes it a variety of *rimosa*.

CICADA Linn.

- C. tibicen* Linn. = *pruinosa* Say. The "dog-day Harvest fly"; common during the latter part of July and August throughout the State.
- C. canicularis* Harr. Occurs with the preceding at New Brunswick and northward: Manchester, Staten Island (Ds). It is smaller and Mr. Ashmead declares it a good species on genital structure (Sm).
- C. marginata* Say = *auletes* Germ. Da Costa, Riverton, IX, 10 (Jn, Hnt), Staten Island, VII (Ds), Lakewood, common, New Brunswick, rare (Sm).

CARINETA Am. et. Serv.

- C. parvula* Say. According to Ashmead this occurs all along the Atlantic Coast and should reach New Jersey. It is certain that a species not yet secured by collectors occurs at Anglesea, because it has been heard several times by myself and others. It is probably this form (Sm).

Family MEMBRACIDÆ.

Contains the "tree-hoppers," which are odd-looking creatures, more or less wedge or beech-nut-shaped, the prothorax often abnormally developed into horns, spines, crests or otherwise. They leap and fly quite readily and are commonly found on trees and shrubs. Most of the species are rare and cause little or no injury, some envelop themselves in frothy masses, and some excrete honey-dew.

The only injury that is really notable in New Jersey is caused by the Buffalo tree-hoppers or species of *Cerasa*, which lay their eggs in slits made on fruit trees. This seems to cause a poisoning, the slits form open wounds, checking growth and forming a weak point on a young tree or branch.

Careful pruning to cut out the egg punctures, the cuttings to be afterwards burnt, will usually avoid injury. Insecticides are not indicated.

ENTILIA Burm.

- *E. sinuata* Fab. Merchantville, IV, 22, Camden, XII, hibernating (Ss), Vine-land (U. S. Ag), Staten Island on *Iva frutescens* IX (Ds), Jamesburg, V, 10, Lahaway, V, 20 (Sm).
- *E. bactriana* Germ. Camden, V, 18 (Ss).

PUBLILIA Stål.

- *P. concava* Say. Madison, VI, 15 (Pr); A common species in the eastern United States.
- *P. nigrodorsum* Godg. Madison, VI, 12 (Pr).

CERESA Am. et Serv.

- *C. diceros* Say. Ft. Lee (Bt), Madison (Pr), Caldwell (Cr), Staten Island, VII (Ds), Woodbury, VI, 23, Anglesea, IX, 5 (Ss).
- *C. bubalus* Fabr. Orange Mts., Ft. Lee (Bt), Madison (Pr), Staten Island, VII (Ds), New Brunswick, VII (Sm), Camden, IX, 14 (Ss). The common "Buffalo tree-hopper," seen in specimens or by its work almost everywhere in the State (Sm).
- *C. brevicornis* Fitch. New York and westward.
- *C. taurina* Fitch. Merchantville, Atco, VI, 21 (Ss), Staten Island, V, VII, VIII (Ds).
- *C. basalis* Wlk. (?) One specimen, probably this species, Orange Mts.

STICTOCEPHALA Stål.

- *S. inermis* Fabr. Eastern U. S., and doubtless in New Jersey.
- *S. festina* Say. Anglesea, V, 28 (Sm).
- *S. lutea* Wlk. Woodbury, VI, 23 (Ss), Madison (Pr), Atco, VI, 4 (Sm).

THELIA Am. et Serv.

- *T. bimaculata* Fabr. Common on Locust: Madison, VIII, 12 (Pr), Caldwell (Cr), Morris Plains (Jn), "New Jersey" (Bt. Ss).

♂ *T. turriculata* Emmons. "New Jersey" (Goding.)

♂ *T. cratægi* Fitch. "New Jersey" (Ss).

♂ *T. univittata* Harr. Madison (Pr).

♂ *T. acuminata* Linn. Staten Island (Ds).

♂ *T. pyramidoides* Godg. Sparta, VII (Ds).

♂ TELAMONA Fitch.

♂ *T. reclinata* Fitch. Staten Island (Ds), and doubtless belongs to New Jersey proper.

♂ *T. monticola* Fab. = *T. querci* Fitch. Common to N. Y., N. C., Mich., &c., and doubtless occurs in New Jersey.

♂ *T. ampelopsides* Harr. Caldwell (Cr), "New Jersey" (Ss), Staten Island, VII, VIII (Ds), New Brunswick, Hammonton, Lakewood (Sm).

♂ *T. concava* Fitch. Anglesea, VII, 8 (Ss).

♂ *T. coryli* Fitch. Described from N. Y., credited to Pa., Ill. and Mich.: doubtless occurs in New Jersey.

♂ *T. fasciata* Fitch = *unicolor* Fitch. "New Jersey" (Ss).

♂ *T. inornata* Godg. Madison, VIII, 15 (Pr).

♂ HELIRIA Stål.

♂ *H. scalaris* Fairm = *Telamona fagi* Fitch. "N. Y., Can., Ill.," and doubtless occurs in New Jersey.

♂ *H. cristata* Fairm. "N. Y., Ill.," and will probably be found in New Jersey.

♂ ARCHASIA Stål.

♂ *A. galeata* Fabr. Madison (Pr), Atlantic City, VI, 26, Anglesea (Ss).

♂ SMILIA Germ.

♂ *S. camelus* Fabr. Madison, occasional (Pr).

♂ ACUTALIS Fairm.

♂ *A. tartarea* Say. Jamesburg, VII, 15 (Sm).

♂ *A. semicrema* Say. Credited to N. Y. (Fitch) and Florida (Say): doubtless occurs in New Jersey.

♂ *A. dorsalis* Fitch. Credited to "N. Y., Tex., Mich.," and doubtless occurs in New Jersey.

♂ *A. calva* Say. Common throughout entire eastern U. S.: must occur in New Jersey.

♂ CYRTOLOBUS Goding.

♂ *C. fenestratus* Fitch. Recorded for N. Y. (Fitch), Miss. (Cook), Ills. (Forbes) and other States: doubtless in New Jersey.

♂ *C. vau* Say. Common to N. Y., Pa., and Miss. Valley: will certainly be found in New Jersey.

♂ *C. sculpta* Wlk. Madison, VI, 12, 22 (Pr).

ATYMNA Say.

- A. *inornata* Say. Merchantville (Ss).
 A. *discoidalis* Fitch. Woodbury (Ss), Sparta, VII (Ds).
 A. *castanea* Fitch. Sparta, VII (Ds), Madison (Pr).
 A. *quercei* Fitch. A very abundant species on oak, which certainly will be found in New Jersey.

The species *Atymna viridis*, *cineureum*, *maculifrontis*, *pallidifrontis* and *inermis*, described in New York, will probably be found to occur in New Jersey.

OPHIDERMA Fairm.

- O. *salamandra* Fairm. Eastern U. S., and doubtless in New Jersey.
 O. *nigricephala* Fitch. Described from N. Y., and probably occurs in New Jersey.
 O. *cineureum* Fitch. Madison, VIII, 11 (Pr).

VANDUZZEA Goding.

- V. *arquata* Say. "New Jersey" (Ss), Madison, VIII, 6, 30 (Pr).

CARYNOTA Fitch.

- C. *marmorata* Say. "New Jersey" (Bt., Ss., Jn).
 C. *mera* Say. Merchantville, VI, 29 (Ss), Orange Mts., VII, 5 (Jn), Madison, VIII, 6 (Pr).

PLATYCOTIS Stål.

- P. *sagittata* Germ. = *Thelia belligera* Say. Penna. & Fla. (Say).
 P. *quadrivittata* Say. Caldwell (Cr).

ENCHENOPA Am. et Serv.

- E. *binotata* Say. Caldwell (Cr), Madison (Pr), Brigantine, Woodbury, VI, 23 (Ss), Morristown (U. S. Ag), Lakewood, VII, 10, New Brunswick (Sm).

CAMPYLENCHIA Stål.

- C. *curvata* Fab. = *Enchenopa latipes*. Caldwell (Cr), Madison (Pr), Staten Island, VI, VII (Ds), Merchantville, VII, 29 (Ss), Anglesea, Jamesburg, VII, 15; common throughout the State (Sm).

MICROCENTRUS Stål.

- M. *caryæ* Fitch. "New Jersey" (Ss), Madison, VIII, 11 (Pr); common to the eastern U. S.
 M. *perditus* Nord. Manchester, IX (Ds).

Family FULGORIDÆ.

The "lantern-fly" family, represented by monstrous and bizarre forms in tropical countries; but in New Jersey by insignificant, though often odd, forms. There is no real typical form of body in this family, some having long slender thoracic processes, others none at all; some have broad wings laid roof-like along the sides, others have them narrow and almost flat over the abdomen.

None that occur in our State are in the least harmful, while most of them may be fairly accounted rare.

✓ 0 Sub-family **FLATINÆ.**✓ 0 **ORMENIS** Stål.

- ✓ 0 *O. pruinosa* Say. Caldwell (Cr), Madison (Pr), Little Falls, on birch (Ds), New Brunswick, VII, 20, common (Sm), Riverton, IX, 11 (Jn): occurs commonly on grape.

✓ 0 **PÆCILOPTERA** Latr.

- ✓ 0 *P. septentrionalis* Spin. Caldwell (Cr), Madison (Pr), Staten Island, VIII, IX (Ds), Riverton and Westville, VIII (Jn), Lahaway, V (Sm).

✓ 0 **CATONIA** Uhler.

- ✓ 0 *C. nava* Say. Eastern U. S.; doubtless in New Jersey.
 ✓ 0 *C. cinctifrons* Fitch. Eastern U. S.; doubtless in New Jersey.

✓ 0 **AMPHISCEPA** Germ.

- ✓ 0 *A. bivittata* Say. Madison (Pr), Little Falls, VIII, Staten Island, VII (Ds), Riverton, IX, 25 (Jn), Jamesburg, VIII, 10, Burlington Co., August (Sm).

✓ 0 **HELIOPHTERA** Am. et Serv.

- ✓ 0 *H. pallida* Say. Pennsylvania and Florida (Say).
 ✓ 0 *H. opaca* Say. "New Jersey," (Uhler).

✓ 0 Sub-family **ISSINÆ.**✓ 0 **ISSUS** Fabr.

- ✓ 0 *I. simplex* Wlk. Woodbury, VII, 29 (Ss).

✓ 0 **BRUCHOMORPHA** Newm.

- ✓ 0 *B. oculata* Newm. Common in Eastern U. S.; doubtless occurs in New Jersey.
 ✓ 0 *B. dorsata* Fitch. Doubtless occurs in New Jersey.

✓ 0 **NASO** Fitch.

- ✓ 0 *N. robertsonii* Fitch. Maryland (Uhler), and probably in New Jersey.

Sub-family CALOSCELINÆ.

PHYLLOSCELIS Germ.

- ✓ 6 *P. atra* Germ. Madison (Pr).
P. pallescens Germ. Eastern U. S., and probably in New Jersey.
P. sp. nov. Lahaway on Cranberry bogs, in May.

LAMENIA Stål.

- ✓ *L. vulgaris* Fitch. Madison, VIII, 10 (Pr), Southern N. J.

Sub-family DICTYOPHORINÆ.

DICTYOPHORA Germ.

- D. sp. nov.* Anglesea, VII, 20, IX, 6 (Sm).

SCOLOPS Schaum.

- S. sulcipes* Say. Madison (Pr), Westville (Jn), "New Jersey" (Ss), Ocean Co., (Sm).
S. angustatus Uhl. Riverton, IX, 4 (Jn).
S. grossus Uhl. Westville, VIII, 18 (Jn).

Sub-family CIXIINÆ.

OTIOCERUS Kirby.

- ✓ *O. amyotii* Fitch. Madison, VIII, 30 (Pr).
✓ *O. coquebertii* Kirby.
✓ *O. degeerii* Kirby. Madison, VIII, 11 (Pr).
✓ *O. signoretii* Fitch.
✓ *O. stollii* Kirby.
✓ *O. wolffi* Kirby. All these occur commonly in the Eastern U. S. and therefore, doubtless, in New Jersey.

BOTHRIOCERA Burm.

- 6 *B. bicornis* Wlk. "New Jersey" (Uhler).

CIXIUS Latr.

- 6 *C. colæpeum* Fitch. N. Y. and doubtless in New Jersey.
6 *C. albicincta* Germ. N. Y. and doubtless in New Jersey.
6 *C. pini* Fitch. N. Y. and probably in New Jersey.
6 *C. stigmatus* Say. "New Jersey" (Jn), Madison, VIII, 6 (Pr).
6 *C. vicarius* Wlk. Probably occurs in New Jersey.

C MYNDUS Stål.

M. impunctatus Fitch. Common in eastern U. S., and doubtless in New Jersey.

C OTIARUS Stål.

O. quinquelineata Say. New Jersey (Say).

O. humilis Say. Madison, VIII, 18 (Pr).

O OECLEUS Stål.

O. decens Stål. Anglesea, V, 28 (Sm).

O Sub-family DELPHACINÆ.

C STENOCRANUS Fieb.

S. dorsalis Fitch. Eastern U. S. generally; doubtless in New Jersey.

S. lautus Van D. Riverton (Jn), N. Y. City (Van Duzee).

O MEGAMELUS Fieb.

M. marginatus Van D. Anglesea (Sm).

O PISSONOTUS Van D.

P. brunneus Van D. N. Y. City (Van Duzee).

O STOBÆA Stål.

S. tricarinata Say. Riverton (Jn), Merchantville, X, 29 (Ss), New Brunswick, VII, 20 (Sm).

O LIBURNIA Stål.

L. ornata Stål. Eastern U. S. generally; doubtless in New Jersey.

L. pellucida Fab. Eastern U. S., and doubtless in New Jersey.

L. detecta Van D. New York City and doubtless in New Jersey.

L. puella Van D. New Jersey (Van Duzee), Riverton, Philadelphia (Jn)

L. osborni Van D. New Jersey in May (Sm).

O PENTAGRAMMA Van D.

P. vittatifrons Uhl. New Jersey (Uhler).

O Family CERCOPIDÆ.

These are the "frog-hoppers" or "spittle insects," so called because of the shape of the adults, which is broad and squat, the leaping power being also well

developed, and because the larvæ live in little masses of white froth resembling spittle. In this group the thorax is normal in form, without processes, and not produced back over the abdomen as in the case of the tree-hoppers.

While the "frog-spittle" is not uncommon in meadows, and sometimes attracts attention on cranberry bogs, yet none of the species rank as really injurious insects.

○ Sub-family **CERCOPINÆ.**

○ **MONECPHORA** Am. et Serv.

M. *bicincta* Say. Woodbury, VII, 29, Brigantine (Ss), Glassboro, VII, 20 (Greene), Clementon, VII, 26 (Jn), Jamesburg, VII, 2, 15 (Sm). A variety *atra*, lacking the reddish bands is found occasionally (Sm), and another, *ignipecta*, occurs at Madison, VIII, 6 (Pr).

○ Sub-family **APHROPHORINÆ.**

○ **LEPYRONIA** Am. et Serv.

L. *quadrangularis* Say. Ft. Lee (Bt), Collingwood, III, 2, Camden, I, 19 (Ss), Riverton (Jn), Staten Island, IX (Ds).

○ L. *angulifera* Uhler. Ocean Co., (Uhler).

○ **APHROPHORA** Germ.

○ A. *quadrinotata* Say. Madison (Pr), Shark River, VI, 6 (Jn), Orange Mts. (Cr), "New Jersey" (Ss), Staten Island, IX (Ds).

○ A. *parallela* Say. Short Hills in Pine (Bt), Anglesea in July (Jn), Staten Island, VII (Ds).

○ A. *saratogensis* Fitch. N. Y. and D. C.; doubtless occurs in New Jersey. 2.

△ A. *signoretii* Fitch. Described from N. Y., and probably occurs in New Jersey.

○ **PHILÆNUS** Stål.

○ P. *lineatus* Linn. North America generally: doubtless belongs to New Jersey fauna.

○ P. *spumarius* Germ. North America generally, especially northward; probably in New Jersey, at least in northern part.

○ **CLASTOPTERA** Germ.

○ C. *proteus* Fitch. Madison, rare (Pr).

○ C. *xanthocephala* Germ. Anglesea, VII, 23, New Brunswick, VII, 20 (Sm).

○ C. *obtusa* Say. Madison (Pr), High Bridge, IX, 1 (Ss), Riverton, IX, 7 (Jn).

○ *Achatina* Germ., *pini* Fitch and *testacea* Fitch have been placed under *obtusa* as varieties by Ball.

Family BYTHOSCOPIDÆ.

The families *Bythoscopidæ*, *Tettigonidæ* and *Jassidæ* contain the species usually known as "leaf-hoppers." They are long, slender, tapering posteriorly, the head short, more or less crescent shaped, closely applied to the thorax, the feelers very short and bristle-like, the hind legs long and fitted for jumping. They occur on grasses, shrubs and trees of all kinds and many are distinctly injurious. A good example is the grape-leaf hopper which occurs in



Fig. 36.—*Athysanus striatulus*



Fig. 37.—*Thamnotetix fitchii*.



Fig. 38.—*Agallia 4-punctata*.

swarms on the foliage from mid-summer on, punctures the cells from the under side and causes the appearance of a yellow spot which turns brown later, so that when the punctures are numerous the entire leaf becomes dry, brittle and lifeless. Apple trees, especially when young, frequently suffer in the same way and many other plants have the foliage either defaced or seriously harmed.

In general the insects winter as adults, in rubbish or crevices, and lay eggs early in spring, two or more generations developing in the course of the summer.

Remedial measures are, attracting the insects to light, which is not always practical, capturing them on sticky surfaces, which is useful in the vineyard, and spraying with soapsuds or diluted kerosene, which has the largest range of usefulness.

Capturing on sticky surfaces is done by jarring the vines so as to cause the insects to fly up in clouds and at the same time waving a large fan, coated with coal tar, or something similar, close to the foliage. Immense numbers of specimens are caught in this way and if the method is persisted in for a few days few insects will be left. The best time to do this fanning is in the early evening.

Sprays should be fine, should be applied while the insects are yet immature or, if flying forms are already present, the plants should be disturbed so as to cause them to fly and, the spray being directed around the outside of the bush or tree, to hit these flying specimens.

Taken as a whole, the injuries caused by the members of this family are little noted and not much complained of.

BYTHOSCOPIUS Germ.

- B. variabilis* Fitch. N. Y. and New England; doubtless in New Jersey.
- B. sobrius* Wlk. Credited to N. Y.; probably occurs in New Jersey.
- B. cognatus* Van D. Credited to N. Y.; probably occurs in New Jersey.
- B. fenestratus* Fitch. N. Y. and N. C.; doubtless in New Jersey.
- B. pruni* Prov. N. Y. and northern U. S.; probably in New Jersey.
- B. minor* Fitch. N. Y. and Md.; doubtless in New Jersey.
- B. nigrinasi* Fitch. N. Y., Conn., N. C.; doubtless in New Jersey.
- B. distinctus* Van D. N. Y., Md., N. C.; doubtless in New Jersey.
- B. fagi* Fitch. Credited to New York; probably also in New Jersey.

PEDIOPSIS Burm.

- P. viridis* Fitch. Riverton, IX, 25 (Jn).
- P. trimaculata* Fitch. Common in New York and adjacent territory; doubtless also in New Jersey.
- P. sordida* Van D. Staten Island (Ds).

IDIOCERUS Lewis.

- I. pallidus* Fitch. Common in New York and doubtless occurs in New Jersey.
- I. suturalis* Fitch. Common in New York, and will probably be found in New Jersey.
- I. nervatus* Van D. New Jersey (Van Duzee).
- I. lachrymalis* Fitch. New York, common; probably also in New Jersey.
- I. alternatus* Fitch. Common throughout the eastern U. S.; doubtless in New Jersey.
- I. cratægi* Van D. Common on thorn in New York and west to Iowa; doubtless also in New Jersey.
- I. maculipennis* Fitch. New York to Iowa; doubtless in New Jersey.
- I. provancheri* Van D. New York to Iowa; probably also in New Jersey.

AGALLIA Curtis.

- A. 4-punctata* Prov. Jamesburg, Ocean, Burlington and Monmouth Counties: common on Cranberry bogs (Sm), Madison (Pr); it is probable that the species feeds rather on the weeds and grasses found on the bogs than on the Cranberry plant itself. June, July, August.
- A. sanguinolenta* Prov. Merchantville, X, 29, Anglesea, VII, Jamesburg, VII, 15 (Sm).
- A. constricta* Van D. Anglesea, southern N. J. (Sm.), Madison, VI, 1 (Pr).
- A. novella* Say. Riverton (Jn).

Family TETTIGONIDÆ.

Sub-family TETTIGONINÆ.

ONCOMETOPIA Stål.

- O. undata Fab. "New Jersey" (Bt), Anglesea (Ss), Riverton, VII, 31 (Jn).
 O. costalis Fab. Canada & U. S., west to Rocky Mts.

AULACIZES Am. et Serv.

- A. irrorata Fab. Woodbury, VI, 4, Anglesea (Ss).
 A. guttata Sign. "N. Y. and Ohio to Fla. and Mex."; should be found in New Jersey.

TETTIGONIA Fabr.

- T. bifida Say. "New Jersey" (Bt), Madison (Pr), Riverton, IX, 11 (Jn).
 T. tripunctata Fitch. N. Y., and doubtless occurs also in New Jersey.
 T. hieroglyphica Say. Canada and U. S. generally: probably also in New Jersey.

DIEDROCEPHALA Spin.

- D. coccinea Forst. Camden, IX, 27 (Ss), Riverton, VIII, 21 (Jn), Staten Island, VI, VII, VIII (Ds), New Brunswick, VII, 27, Orange Mts., VI, 10, common throughout the State (Sm). (*Tettigonia 4-vittata* Say, is considered a synonym of this; but may possibly form a color variety).
 D. mollipes Say. Madison (Pr), Staten Island, VII, VIII (Ds), Riverton, VIII, 21 (Jn), Clementon, V, 22 (Viereck), Jamesburg, VI, 20, VII, 15, Lahaway, V, 18, Anglesea, VI, 20, New Brunswick, VII, 20 (Sm): very abundant over a large part of the U. S., but not injurious.
 D. angulifera Wlk. Canada, New York and West to Kansas; probably also in N. J.
 D. novæ boracensis Fitch. New York to Maryland, and doubtless common in grassy lowlands in New Jersey.

HELOCHARA Fitch.

- H. communis Fitch. Caldwell, common (Cr), New Jersey, III (Ds).

Sub-family GYPONINÆ.

XEROPHLEA Germ.

- X. viridis Fab. Philadelphia, IV, 25 (Jn).

GYPONA Germ.

- G. octolineata Say. = flavilineata Fitch. Camden, IX, 22, Anglesea, VII, 2 (Ss), Madison (Pr), Riverton, VIII, 21, IX, 25 (Jn), Lahaway, IX, 20 (Sm), Staten Island, VIII (Ds).

- ✓✓ *G. striata* Burm. Orange Mts., Jamesburg, Anglesea (Sm). It is probably
octo-lineata.
- ✓ *G. melanota* Spang. "New Jersey" (Van Duzee), Staten Island, VIII (Ds),
 Madison, VII, 25, VIII, 6 (Pr).
- ✓✓ *G. bimaculata* Spang. Dela. Water Gap (Ss), Staten Island, VIII, X (Ds).
- ✓✓ *G. scarlatina* Fitch. Merchantville, X, 15 (Ss).
- ✓✓ *G. rugosa* Spang. Riverton (Jn).
- ✓ *G. albosignata* Uhl. Costal plain of U. S. as far north as Cape Ann, Mass.
 (Uhler).
- ✓ *PENTHIMIA* Germ.
- ✓ *P. americana* Fitch. Anglesea (Ss), Atco, VI, 18 (Jn), Jamesburg V, 10
 (Sm), Madison, VI, 27 (Pr).
-

Family JASSIDÆ.

ACOCEPHALUS Germ.

- ✓ *A. mixtus* Say. New Brunswick, VII, 20 (Sm).

XESTOCEPHALUS Van Duzee.

- ✓ *X. pulicarius* Van D. New York and probably New Jersey.

HECALUS Stål.

- ✓ *H. lineatus* Uhl. Male = *H. fenestratus* Uhl. Shark River, VII, 9 (Jn),
 New Jersey (Van Duzee).

SPANGBERGIELLA Sign.

- ✓ *S. vulnerata* Uhl. A specimen of this interesting species was sent by Prof.
 Smith.

PARABOLOCRATUS Fieb.

- ✓ *P. viridus* Uhl. Massachusetts to Iowa and west; probably in New Jersey.

PARAMESUS Fieb.

- ✓ *P. vitellinus* Fitch. Madison, VI, 30 (Pr), New Brunswick (Sm).
- ✓ *P. jucundus* Uhl. Maryland (Uhler), and I have no doubt occurs through-
 out the north.

PLATYMETOPIUS Burm.

- ✓ *P. acutus* Say. Philadelphia, Pa.
- ✓ *P. frontalis* Van D. Madison, VI, 7 (Pr).

DELTOCEPHALUS Burm.

- ✓ *D. sayi* Fitch. Clementon (Jn).
- ✓ *D. inimicus* Say. Camden, IX, 27 (Ss), Jamesburg (Sm).

- *D. nigrifrons* Forbes. Camden, IX, 27 (Ss).
○ *D. simplex* Van D. "New Jersey" (Van D); referred to *Thamnotettix*
O. & B.
○ *D. obtectus* O. & B. Riverton, IX, 11 (Jn).
○ *D. virgulatus* Uhl. "New Jersey" (Uhler).
○ *D. retroversus* Uhl. Florida to northern New Jersey (Uhler).
○ *D. sp. nov.* Riverton (Jn)

○ *ATHYSANUS* Burm.

- *A. plutonius* Uhl. Madison, VI, 16 (Pr).
○ *A. curtisii* Fitch. Common to eastern U. S.; doubtless occurs in New Jersey.
○ *A. ignotus* Baker. Staten Island (Ds).
○ *A. striatulus* Fall. Anglesea, V, 28, Jamesburg, VII, 15, New Brunswick, VII,
20, Burlington Co., in August; common on Cranberry bogs; but not,
apparently, injuring the plants (Sm).
○ *A. extrusus* Van D. Madison, VI, 16 (Pr).
○ *A. striola* Fall. Anglesea, V, 20 (Sm).
○ *A. sp. nov.* Riverton (Jn).

○ *EUTETTIX* Van D.

- *E. marmorata* Van D. Burlington Co., VIII, 19 (Sm).
○ *E. lurida* Van D. Maryland, etc., and doubtless in New Jersey.
○ *E. southwicki* Van D. New York City.
○ *E. johnsoni* Van D. Madison, VI, 30 (Pr).
○ *E. picta* Van D. Pennsylvania, and doubtless in New Jersey.
○ *E. seminuda* Say. Throughout the eastern U. S.
○ *E. strobi* Fitch. N. Y. to Texas; will certainly be found in New Jersey.

○ *GONIOGNATHUS* Van D.

- *G. palmeri* Van D. Staten Island, VI (Ds).

○ *PHLEPSIUS* Fieb.

- *P. excultus* Uhl. N. Y. to Fla. (Van D); doubtless in New Jersey.
○ *P. humidus* Van D. "New Jersey" (Jn).
○ *P. truncatus* Van D. Philadelphia (Jn).
○ *P. irroratus* Say. Riverton (Jn), New Brunswick, southern, N. J., Anglesea,
V, 20 (Sm), Staten Island (Ds).
○ *P. fuscipennis* Van D. Anglesea, in June (Sm).
○ *P. latifrons* Van D. Maryland and, probably, New Jersey.
○ *P. fulvidorsum* Fitch. Riverton, IX, 11 (Jn), Burlington Co., July (Sm).
○ *P. uhleri* Van D. Maryland (Van D); probably New Jersey.
○ *P. majestus* O. & B. Anglesea (Ss).
○ *P. decorus* O. & B. "New Jersey" (Jn).

BACINOPTERUS Van D.

♂ *A. acuminatus* Van D. "New Jersey" (Van Duzee).

SCAPHOIDEUS Uhl.

♂ *S. immixtus* Say. New Brunswick, VII, 20 (Sm).

♂ *S. intricatus* Uhl. "New Jersey."

♂ *S. luteolus* Van D. "New Jersey" (Van D).

♂ *S. lobatus* Van D. Madison, VIII, 6 (Pr).

♂ *S. consors* Uhl. N. Y., Md., Tex. (Uhler).

♂ *S. jucundus* Uhl. Canada, N. Y., and probably New Jersey.

♂ *S. auronitens* Prov. Canada to Mississippi and probably New Jersey.

OTHAMNOTETTIX Zett.

♂ *T. clitellaria* Say. Staten Island, VI, VII (Ds), Madison (Pr), Anglesea, V, 25, New Brunswick, VII, 16, 20 (Sm).

♂ *T. eburata* Van D. Canada to N. Y., (Van D) and probably New Jersey.

♂ *T. kennicotti* Uhl. Madison, VIII, 6 (Pr).

♂ *T. melanogaster* Prov. N. Y., and doubtless in New Jersey.

♂ *T. fitchii* Van D. Burlington Co., on Cranberry bogs (Sm).

♂ *T. smithi* Van D. New Jersey (Van D).

LIMOTETTIX Sahlb.

♂ *L. exitiosa* Uhl. Riverton, IX, 11, X, 9 (Jn).

CHLOROTETTIX Van D.

♂ *C. unicolor* Fitch. Jamesburg, VII, 15 (Sm), Madison, VII, 25 (Pr).

♂ *C. viridia* Van D. Riverton, X, 9 (Jn), Jamesburg, VII, 15, Anglesea, VI, New Brunswick, VII, 20 (Sm).

♂ *C. tergata* Fitch. N. Y. to Fla., and doubtless in New Jersey.

♂ *C. galbanata* Van D. N. Y. to N. C., and doubtless in New Jersey.

♂ *C. vanduzeei* Baker. Staten Island (Ds).

♂ JASSUS Fab. = ♂ CÆLIDIA Germ.

♂ *J. olitorius* Say = *subbifasciatus* Say. Madison, VII, 25, VIII, 10 (Pr), Caldwell (Cr), Riverton (Jn), Woodbury, VII, 29 (Ss).

♂ *J. bifasciatus* Say. Staten Island, IX (Ds).

GNATHODUS Fieb.

♂ *G. punctatus* Thunb. Lahaway in May (Sm).

♂ *G. abdominalis* Van D. Anglesea, V, 20, New Brunswick, VII, 20 (Sm).

♂ *G. impictus* Van D. New Brunswick, VII, 20 (Sm).

CICADULA Zett.

- *C. sex-notata* Fall. Anglesea, V, 21 (Sm).
 ○ *C. variata* Fall. N. Y., and probably in New Jersey.
 ○ *C. punctifrons* Fall. N. Y., and probably in New Jersey.
 ○ var *americana* Van D. N. Y., and probably in New Jersey.

CALEBRA Fieb.

- *A. allostriella* Fall. Common to the eastern U. S., and doubtless in New Jersey.

DICRANEURA Hardy.

- *D. fieberi* Low. "New Jersey" (Gillette).

EMPOASCA Walsh.

- *E. smaragdula* Fall. Common to eastern U. S., doubtless in New Jersey.
 ○ *E. fabæ* Harr. U. S. generally; doubtless in New Jersey.
 ○ *E. mali* LeB. Anglesea, V, 25, Jamesburg, VII, 15, New Brunswick, VII, 20, Lahaway, V, 12 (Sm); the apple leaf-hopper, seriously troublesome in some years.
 ○ *E. obtusa* Walsh. New Brunswick, VI, 9, VII, 20 (Sm).

EUPTERYX Curtis.

- *E. flavoscuta* Gill. North Mt., Pa. (Jn), probably in New Jersey.

TYPHLOCYBA Germ.

- *T. tricineta* Fitch. Eastern U. S.; doubtless in New Jersey.
 ○ *T. comes* Say. This species with its varieties *vitis* Harris, and *vitifex* Fitch., is the common grape leaf-hopper which becomes excessively abundant and sometimes injurious in September. It is especially troublesome throughout the southern part of the State.
 ○ *T. vulnerata* Fitch. United States generally.
 ○ *T. obliqua* Say. Montgomery Co., Penna. (Jn), and probably in New Jersey.
 ○ *T. querci* Fitch. New Brunswick, VII, 20 (Sm).
 ○ *T. trifasciata* Say. Common throughout the eastern U. S.
 ○ *T. rosæ* Linn. The common rose leaf-hopper, which occurs throughout the State (Sm).

Family PSYLLIDÆ.

The insects of this family are popularly known as "jumping plant lice" from their active habits; but, as a matter of fact they much more closely resemble a *Cicada* in miniature, both pairs of wings being transparent and obliquely held on the back. The antennæ or feelers are quite long, differing thus from the leaf-hoppers, which they somewhat resemble in general form as well as in size.

The species differ in habit, many of them forming galls, especially on *Celtis*, while others feed upon foliage only. Our only injurious species is the "pear psylla," which not only punctures the leaf and fruit stalk, exhausting the juices, but also excretes a honey-dew in such quantity as to coat the leaves and form a foundation for the development of a black fungus that covers both leaves and fruit and checks development. The insect hibernates as an adult and a thorough spraying just before the buds open, using a



Fig. 39 — Pear psylla; winged adult: enlarged.



Fig. 40 — Appendiculate egg of *Psylla*; much enlarged.

strong whale-oil soap mixture or a crude or kerosene oil mechanical mixture, will kill a large percentage of the hibernating forms as they leave their winter quarters.

For summer treatment the mechanical mixture of kerosene and water, sprayed as directed for leaf-hoppers, is the most practical mixture.

There are few collectors of these little creatures, and Mr. E. A. Schwarz, of Washington, D. C., has kindly revised the list for me and noted the food habits.

Sub-family LIVIINÆ.

LIVIA Latr.

L. maculipennis Fitch. N. Y., west to Ia., doubtless in New Jersey.

L. vernalis Fitch. Common throughout eastern U. S. on *Juncus* sp.; imago abundant in winter on pine trees.

Sub-family APHALARINÆ.

PSYLLOPSIS Loew.

P. fraxinicola Först. Atlantic City in *Fraxinus excelsior* (C. V. R.). Imported from Europe and quite injurious to ash trees (Sz).

APHALARA Forst.

A. calthæ Linn. New Brunswick, VII 27 (Sm), common on *Polygonum hydro-piper* (Sz).

A. sp. nov. Sz. Anglesea, V, 28 (Sm), common on *Solidago* throughout the State (Sz).

Sub-family PSYLLINÆ.

CALOPHYA Lw.

C. nigripennis Riley. Common on sumach, Anglesea, V 2, and probably throughout the State (Sm).

PSYLLA Geoffr.



Fig. 41.—Pear psylla; pupa from above: much enlarged.



Fig. 42.—Pear psylla; pupa from below: enlarged

P. annulata Fitch. N. Y.; doubtless in New Jersey.

P. carpini Fitch. N. Y., common on *Carpinus*; doubtless in New Jersey.

P. buxi Linn. Jersey City (U S N M): an imported species, on *Buxus sempervirens* (Sz).

P. pyricola Forst. The "pear psylla": have found it at Irvington, Parry and Glassboro, though injurious only at the latter point (Sm).

PACHYPSYLLA Riley.

P. celtidis-mamma Riley. Makes galls on leaves of *Celtis* in New Jersey (Bt).

P. celtidis-cucurbita Riley. "New Jersey"; the galls are common on the leaves of hackberry (Bt).

P. celtidis-vesiculum Riley. With the preceding (Bt).

P. venusta O. S. Makes galls on the leaf petioles of hackberry in New Jersey (Bt).

P. celtidis-gemma Riley. Gall-maker on the twigs of hackberry; common in New Jersey (Bt).

Sub-family TRIOZINÆ.

TRIOZA Först.

T. diospyri Ashm. Anglesea, V, 28 (Sm); common wherever persimmon occurs (Sz).

T. tripunctata Fitch. Anglesea, V, 28 (Sm); common, the imago frequently met with in winter on pine trees (Sz).

Family APHIDIDÆ.

The "plant lice," or "green flies," or "Aphis": the first-named being the term most usually employed. They have, when winged, two pairs of large transparent wings, the anterior much the larger; but some forms never develop these organs of flight, and the oval plump bodies with long antennæ, more or less prominent honey-tubes near the anal end, and long legs will serve to identify the colonies clustered about a stem or twig, or on the underside of a leaf. By means of the honey-tubes the insects excrete a honey-dew on which a black fungus develops and chokes the foliage.

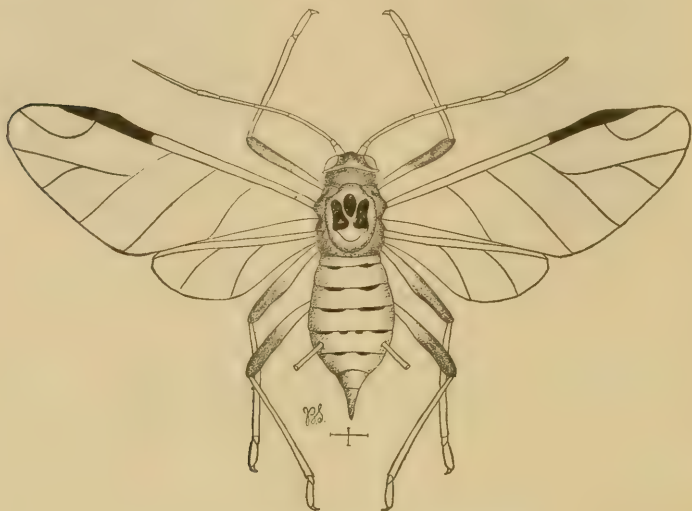


Fig 43.—Wheat plant louse; much enlarged.

The life history of many species is intensely interesting; but briefly stated is generally about as follows: They winter as eggs, from which, in the spring, hatches a wingless form which in a few days begins to give birth to living young resembling the parents, and, like them, *oviparous*, *i. e.*, giving birth to live young, and *parthenogenetic*, *i. e.*, neither male nor female, capable of bringing forth young without a previous union with a male. These young are ready to reproduce in turn in a few days or a week, and from 4 to 8 young per day may be produced under favorable conditions.

Sometime in early summer winged individuals occur and these fly to other localities or other food-plants. They are also parthenogenetic specimens and they found colonies wherever they alight. In the fall, when frost appears and food becomes scarce, the true sexes are produced and eggs laid. In some cases the insects have alternate food-plants, *e. g.* the hop-plant louse which winters on the plum, starts breeding there and migrates to the hop-fields only when the vines are well started. With the approach of cold weather when the hops are being harvested they fly back to the plums again, where they eventually oviposit, only to begin the same cycle next year.



Fig. 44.—Eggs of apple plant louse ; very much enlarged.

The rate of increase among these insects is such that were it not for numerous natural checks they would soon replace every other living thing upon the earth

Remedial measures are, winter pruning if eggs are noticed, the cuttings to be burnt, of course; application of contact insecticides early in the year to destroy the stem-mothers; application of contact insecticides at any time when the insects are noticed. The poison may be either pyrethrum or tobacco decoction, soapsuds or a kerosene mixture—mechanical or emulsion. It *must* be brought into actual contact with the insects and therefore a fine spray nozzle should be used at all times when an application is made against these species.

Under some circumstances cold water will kill plant-lice and a cold storm in middle or late June will play havoc with the migrating forms and may practically exempt the alternate food-plant for the season.

The best and most satisfactory method of dealing with the subject is to use the kerosene emulsion, and spray liberally and frequently. In the melon field cover the infested hills, and to each cubic foot of space beneath the cover evaporate one dram of bisulphide of carbon, allowing the covers to remain on an hour at least.

In this family Mr. Theodore Pergande has kindly furnished numerous notes &c., particularly as to food-plants.

Sub-family APHIDINÆ.

NECTAROPHORA Koch.

- N. liriodendri* Mon. On the tulip-tree, common at Vineland in 1899.
- N. pisi* Kalt. Common on pea, shepherd's purse and other plants.
- N. rudbeckiæ* Fitch. Occurs on golden-rod, rag-weed and *Rudbeckia*.
- N. rosæ* Linn. Common everywhere on the rose: tobacco decoction applied early, is the best remedy against this.
- N. rubi* Kalt. The blackberry plant louse, occasionally abundant near Hamonton.
- N. fragariæ* Koch. A strawberry plant louse; var. *immaculata* Riley, is likely to occur in New Jersey.
- N. sonchi* Linn. Plant louse on *Sonchus oleracea*.
- N. viticola* Thos. Plant louse on grape. Perth Amboy, Montclair (U. S. Ag.)
- N. granaria* Kirby = *avenæ* Fitch. The grain or "wheat louse"; found throughout the State; sometimes common and injurious in the southern counties; generally kept in check by its parasites, and when it does increase abnormally insecticide applications are generally impracticable.
- N. lactucæ* Kalt. The lettuce plant louse.
- N. menthæ* Buckt. Plant louse on mint.
- N. destructor* Johns. Very injurious to peas in 1899.

PHORODON Pass.

- P. humuli* Schrank. The hop plant louse; occurs sparingly throughout the State: Freehold (U. S. Ag.).

RHOPALOSIPHUM Koch.

- R. berberidis* Fitch. Plant louse on barberry.
R. dianthi Schrank. Kinkora (U. S. Ag.): occurs on pinks, carnations and German ivy.
R. solani Thos. The tomato plant louse: sometimes in destructive numbers in Salem and Gloucester Counties (Sm).
R. rhois Monell. Plant louse on sumach.
R. salicis Monell. A feeder on willows.

MYZUS Pass.

- M. ribis* Linn. The currant plant louse: Rutherford (U. S. Ag.), rarely plentiful enough to cause injury.
M. cerasi Fab. Very abundant on cherry throughout the State and sometimes does serious injury: spraying should be done thoroughly in late September to kill off the sexed forms.
M. mahaleb Koch Occurs abundantly on peach, plum and a great variety of other plants.
M. persicæ-niger E. A. Smith. The black peach louse: occurs plentifully throughout the southern part of the State, the underground form often doing serious injury on young trees. North of the red shale I have not met with it in numbers: apply tobacco dust in a trench about the trees or give a heavy dose of kainit, broadcasted, against the root form.

DREPANOSIPHUM Koch.

- D. acerifolii* Thos. Common on the soft maple, *Acer dasycarpum*.

APHIS Linn.

- A. asclepiadis* Fitch. Sometimes common on milk-weeds.
A. brassicæ Linn. The cabbage plant louse, common throughout the State and often seriously injurious in the southern counties.
A. cornifoliæ Fitch. Found on the dogwood.
A. cerasifoliæ Fitch. On the leaves of the wild cherry.
A. cratægifoliæ Fitch Occurs on hawthorn.
A. diospyri Thos. Found on persimmon.
A. gossypii Glover = *cucumeris* Forbes. The "melon louse," often seriously destructive in Monmouth, Burlington, Gloucester, Salem and Camden Counties, but occurring also in all other parts of the State. It has a wide range of food-plants, including most of the common weeds and is one of the species found on the roots of strawberries (Sm).
A. mali Fab. The apple louse: always present throughout the State early in the season and sometimes in great numbers, causing severe injury. Spray very early in the season, as soon as the buds are beginning to open, for at this time the eggs are hatching, and the stem-mothers are easily destroyed.

- A. malifoliæ* Fitch. Also occurs on apple and may be a variety of *mali*.
A. maidis Fitch. The corn louse, often causing serious injury to the young plants by their attacks on the roots.
A. pruni Koch. One of the plum plant lice: Vineland, River Edge (U. S. Ag.).
A. vernoniæ Thos. On iron weed, *Vernonia noveboracensis*.
A. prunifoliæ Fitch. Also found on plum leaves.
A. prunicola Kalt. Newark, Vineland (U. S. Ag.).
A. quercifoliæ Walsh. Plant louse on oak leaves.
A. rumicis Linn. The bean plant louse.
A. sambucifoliæ Fitch. Plant louse on leaves of elder.

Sub-family CALLIPTERINÆ.

MONELLIA Cestl.

- M. caryella* Fitch. Occurs on hickories.

CHAITOPHORUS Koch.

- C. negundinis* Thos. Occurs on box elder.
C. loniceræ Monell. Found on *Lonicera sempervirens*.
C. populifoliæ Fitch. On leaves of poplar: (Festlund questions whether this is not *C. populi* (L)).
C. populicola Thos. On shoots and leaves of poplar.
C. pinicolens Fitch. Plant louse on pine.
C. viminialis Monell. Feeds on willows.

CALLIPTERUS Koch.

- C. bella* Walsh. Found on oak.
C. asclepiades Monell. Common on milkweeds.
C. caryæ Monell. On leaves of hickory.
C. discolor Monell. Occurs on oak.
C. hyalinus Monell. An oak feeder.
C. punctata Monell. Also found on oak.
C. ulmifolii Monell. On leaves of elm.
C. walshii Monell. Another oak louse.
C. betulæcolens Fitch. Occurs on birch.
C. castaneæ Fitch. Occurs on chestnut.

MELANAXANTHUS Buckton.

- M. salicti* Harr. Occurs on willow.
M. salicicola Uhler. Found on poplar and willow.

Sub-family LACHNINÆ.

LACHNUS Burm.

- L. abietis* Fitch. Found on spruce.
L. alnifoliæ Fitch. Feeds on leaves of alder : is probably a *Callipterus* (Pergande).
L. laricifex Fitch. On the American larch or tamarack.
L. quercifoliæ Fitch. On the leaves of oak : is a *Callipterus* (Pergande).
L. strobis Fitch. Feeds on the white pine.
L. salicelis Fitch. A willow plant louse : probably a *Melanoxanthus* (Pergande).
L. caryæ Harr. Locally common on hickory and walnut and has been accused of causing the death of trees near Glassboro (Sm).

PHYLLAPHIS Koch.

- P. fagi* Linn. Occurs on beech : Trenton (U. S. Ag.).

Sub-family SCHIZONEURINÆ.

SCHIZONEURA Hart.

- S. americana* Riley. The woolly louse on elm.
S. imbricator Fitch. The "beech blight" or woolly louse.
S. lanigera Hausm. The woolly apple louse : found all over the State, sometimes quite numerous, but not as yet seriously injurious : it forms galls on the roots and clusters in masses about wounds on trunks and branches ; the latter type is easily controlled by diluted kerosene sprays.
S. strobis Fitch. Woolly louse on white pine.
S. ulmi Linn. A common form on elm.
S. corni Fab. Feeds on the dogwood.

COLOPHA Monell.

- C. ulmicola* Fitch. Makes the well known cockscomb gall on elm.

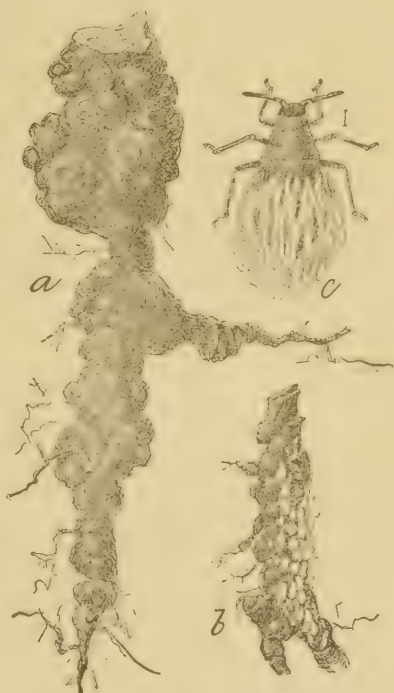


Fig. 45.—Woolly apple louse : injury to the roots is shown at *a* ; the adult at *c*, showing the woolly fibres, much enlarged.

HORMAPHIS O. S.

- H. spinosus* Shimer. Makes gall on the fruit buds of witch-hazel, N. J. (Bt).
H. hamamelidis Fitch. Very common, making galls on leaves of witch-hazel (Bt).

Sub-family PEMPHIGINÆ.

PEMPHIGUS Hart.

- P. populicaulis* Fitch. Makes galls at the junction of stem and leaf of *Populus monilifera* at Passaic (Bt).
P. populiglobuli Fitch. Also a gall maker on poplar. Passaic (Bt).
P. populivenæ Fitch. Forms galls on veins of poplar leaves.
P. rhois Fitch. Common on leaves of sumach (Bt), Caldwell (U. S. Ag.).
P. tessellata Fitch. The 'alder-blight; very common, maturing September and October; Stockton (U. S. Ag.).
P. vagabundus Walsh. Common on poplar.
P. acerifolii Riley. Lives on the under side of maple leaves. Freehold, Vineland (U. S. Ag.), Plainfield.

Sub-family CHERMESINÆ.

CHERMES Linn.

- C. laricifoliæ* Fitch. Common on American larch or tamarack.
C. pinicorticis Fitch. Jamesburg—one year rather plentiful (Sm).
C. abieticolens Thos. Edgewood (U. S. Ag.), found on spruce.

Sub-family PHYLLOXERINÆ.

PHYLLOXERA Fonsc.

- P. caryæ-caulis* Fitch. Common, making galls on twigs and leaf stalks of hickory (Bt)
P. caryæ-foliæ Fitch Making galls on leaves of hickory and sometimes common.
P. trimaculatus Pergande. New Brunswick (U. S. Ag.).
P. caryæ-venæ Fitch. Forms plaits or galls along the veins or ribs of hickory leaves.
P. fumipennis Pergande. New Brunswick (U. S. Ag.).
P. vastatrix Planch. The grape *Phylloxera*. Have seen this in almost all parts of the State; but nowhere causing noticeable injury (Sm).



Fig. 46.—Grape Leaf infested by the Phylloxera.

P. avellana Pergande. Montclair (U. S. Ag.).

P. septa Pergande. Montclair (U. S. Ag.).

Family ALEURODIDÆ.

This little family, for which we have no popular name, contains only a very few small species in New Jersey. They somewhat resemble plant lice in appearance, but are covered with a fine whitish powder or flour. In the larval stage they somewhat resemble scales, but as adults both sexes have four well-developed wings

ALEURODES Am. et Serv.

A. abutilonea Hald. Described from Pa., and should occur in New Jersey.

A. brassicæ Wlk. Listed by Ashmead.

A. corni Hald. Described from Penna., and should be found in New Jersey.

Family COCCIDÆ.

These are the "Scale insects" broadly speaking, characterized by a degraded, larva-like form in the female and by the presence of a single pair of wings only in the male, which has also a complete metamorphosis, a long anal style or filament and an extra pair of eyes replacing the mouth, which in this sex is not used at all for feeding purposes.

There are several sub-families, and these differ in their habits as well as in structure and the method of dealing with them

The *Coccinæ* contain the mealy bugs, none of which maintain themselves in any number out doors in our State, and the Maple *Pseudococcus*, which has of late years appeared commonly on the leaves and trunks of city trees. This is easily dealt with by a solid jet of water thrown under pressure, to wash off and crush the very soft insects.

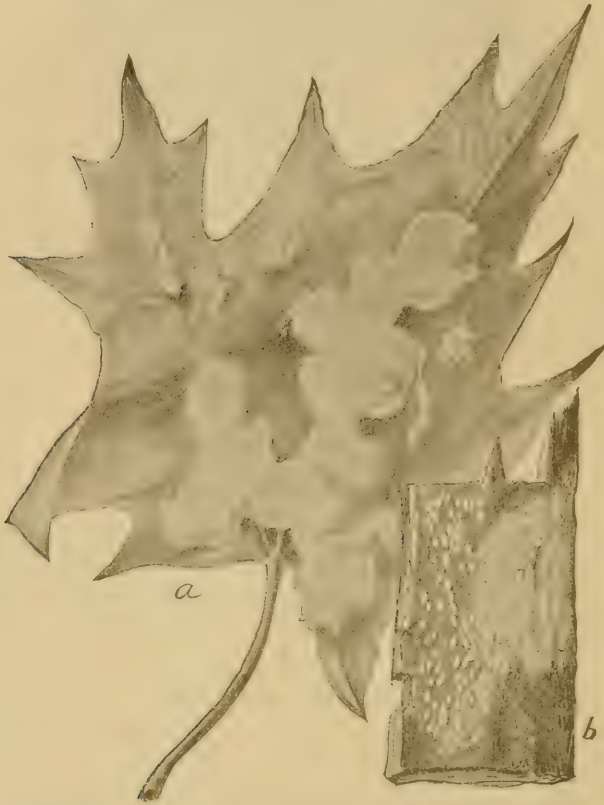


Fig. 48 —*Pseudococcus aceris*: a, the cottony masses covering adult females on leaf; b, young females and males on the bark; natural size.

The *Asterolecaniinae* are represented by only a single species of golden yellow scale which attacks oak and has at times attracted attention on shade trees.

The *Ortheziinae* are peculiar in secreting a waxy, brittle material extending beyond the body in flakes and used to cover the eggs. There is no outdoor species reported for our State.

The *Lecaniinae* are the "soft scales," and the scale is the thickened outer skin of the insect itself. The species are livid gray or brown in color and of good size, varying from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in length, very convex, sometimes

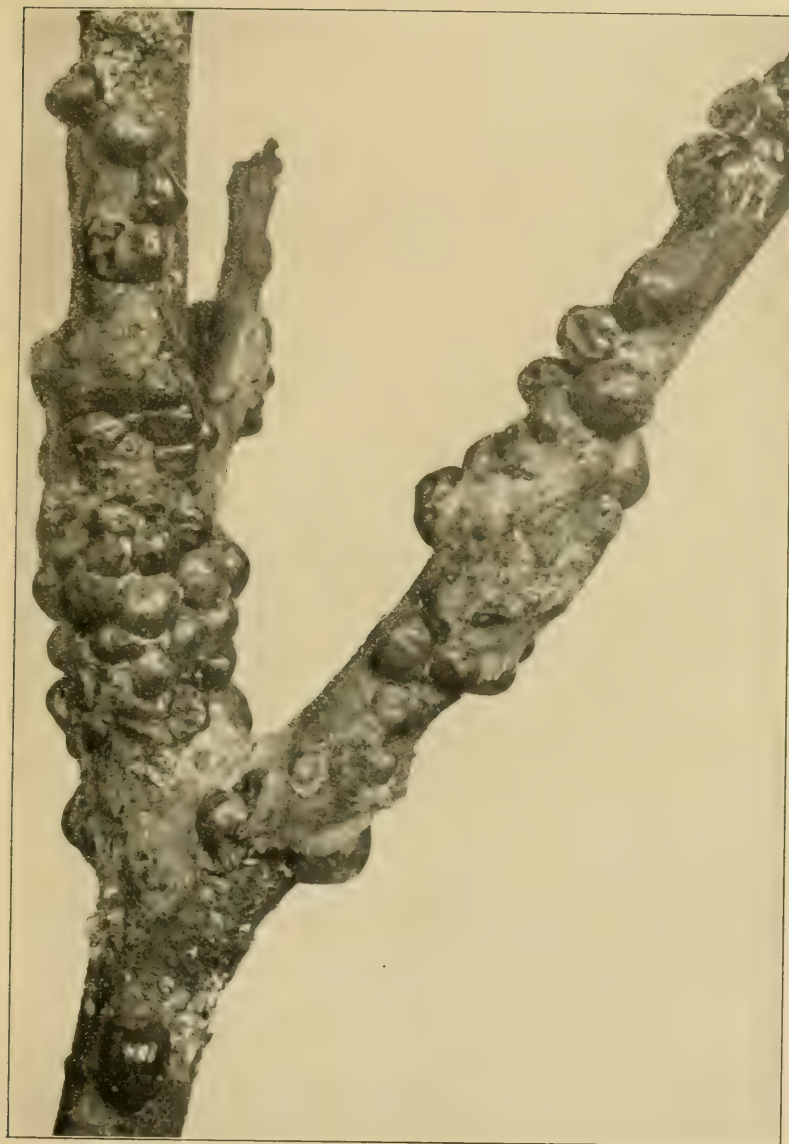


Fig. 47.—The tulip soft scale : adult females.

almost hemispherical. We have only a few species; but of these two, the "cottony maple scale" and the "tulip soft scale," both attacking shade trees, are troublesome. The maple scale produces eggs in spring in a prominent white mass resembling cotton, and the tulip scale brings forth living young late in August or early in September. The maple scale may be treated when the cottony masses appear, with a mechanical mixture of kerosene and soapsuds; the tulip scale may be treated during the winter with crude petroleum, while in the larval stage.



Fig. 49.—Cottony maple scales; *a*, *Pulvinaria acericola* on leaf;
b, *P. innumerabilis* on the twigs.

The *Diaspinæ* contain the "armored scales," and these differ radically from the soft scales because here the scale is separable from the insect itself, which lies loosely beneath it. We have a considerable number of species in our State, attacking a great variety of trees and other plants, but practically only three species are destructive—the San José or pernicious scale, the oyster-shell bark-louse, and the scurfy scale. The first of these is viviparous and winters in the half-grown stage, the other two are oviparous and winter in the egg stage. The first has three full and a partial fourth brood during the season, the others have each one brood only. The differences are important, because of the resulting difference in treatment. The pernicious scale may be attacked during the winter with crude petroleum undiluted, and during the summer at about June 15, August 1, and September 10 with a 10% mixture of kerosene and 90% water in mechanical mixture. The others should be treated early in June, while the larvæ are moving or recently set, with 15% kerosene in water. The scurfy scale is thin and easily corroded; the oyster shell louse thick and

very resistant. Strong caustic washes readily destroy the scurfy scale in winter, scattering the eggs beneath them and causing their destruction ; but these same washes have little effect against the oyster shell scale.

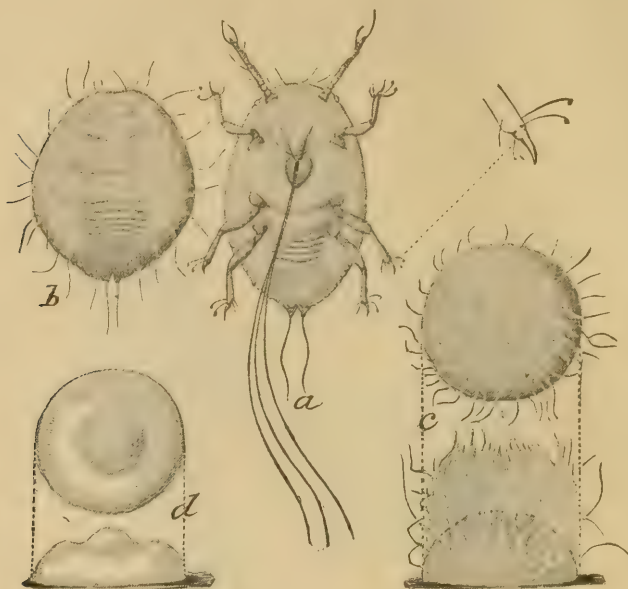


Fig. 50.—Development of an armored scale: *a*, active larva with lancets extended; *b*, somewhat contracted with waxy filaments ready to run together; *c*, first scale just formed from above and side; all much enlarged.

Aside from the winter treatments, the best rule to follow in dealing with scale insects is : find out exactly when the active larvæ are moving about and seeking to fix themselves ; then at short intervals spray one, two or three times as may be necessary with a somewhat weak mixture of soap, kerosene or tobacco, using the material liberally so as to hit every crawling larva and kill all recent sets.

Caustic mixtures act by corroding the scales ; oily mixtures by penetrating beneath them : kerosene and fish oil soapsuds combines both types and should be one of the most effective of our mixtures when its range is once properly ascertained.

Sub-family COCCINÆ.

DACTYLOPIUS Costa.

D. citri Risso. A mealy bug ; common in greenhouses

D. adonidum Linn. Mealy bug ; common in greenhouses.

PHENACOCUS Ckll. = *PSEUDOCOCUS* Auct., not Westw.

P. aceris Sign. Became suddenly common in New Brunswick and several other New Jersey cities in 1895, but disappeared almost completely two years later (Sm). Freehold (U. S. Ag.), Newark, Paterson.

Sub-family ASTEROLECANIINÆ.

ASTEROLECANIUM Targ.

A. quercicola Bouché. Elizabeth, on swamp white oak (Sm), Ridgewood (U. S. Ag).

Sub-family ORTHEZIINÆ.

ORTHEZIA Bosc.

O. insignis Doug. Have received this from greenhouses in New Jersey, and is reported as somewhat injurious (Sm).

Sub-family LECANIINÆ.

PULVINARIA Targ.

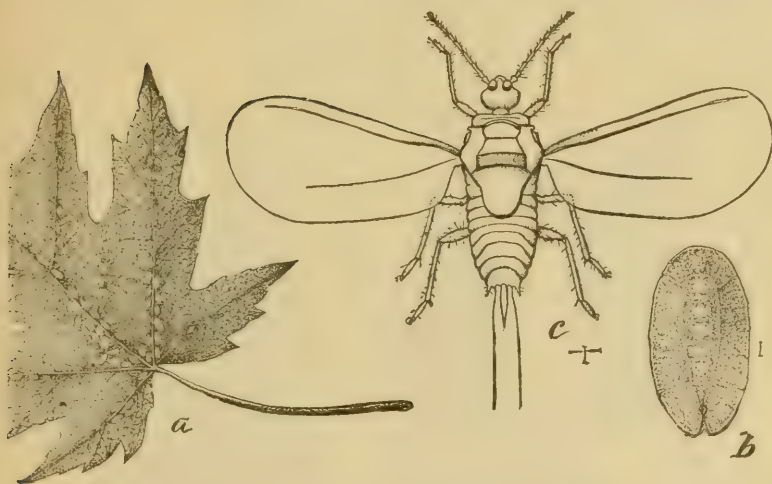


Fig 52.—Cottony maple scale: *a*, leaf covered with young scales; *b*, male scale; *c*, adult male; *b* and *c* much enlarged.

P. acericola Walsh & Riley. A cottony scale on maple, found chiefly on leaves.

P. innumerabilis Rathvon. The "cottony maple scale"; occurring also on grape and Virginia creeper throughout the State, and sometimes very plentiful on city shade trees; chiefly on twigs and branches.

KERMES Auct.

K. kingii Ckll. Found in Mass. and Del., and so may be expected in New Jersey (Ckll).

LECANIUM Illiger.

- L. tulipiferæ* Cook. Englewood, Trenton (U. S. Ag), Bloomfield: common in southern N. J., and wherever the tulip-tree grows in the State; seriously injurious to shade trees in Cumberland Co. (Sm).
- L. nigrofasciatum* Pergande. Paterson (U. S. Ag).
- L. cerasifex* Fitch. A soft scale on plum, common in N. Y., and occasional in New Jersey (Sm), but it is a question whether this is really the species described by Fitch (Ckll).
- L. fitchii* Sign. Will probably occur in New Jersey.
- L. hesperidum* Linn. On oleanders, &c., everywhere.
- L. juglandis* Bouché. N. Y., and probably in New Jersey. This is the insect which has been supposed to be *cerasifex* (Ckll).
- L. persicæ* Fab. Probably occurs in New Jersey.
- L. quercicitrionis* Fitch. N. Y., and probably also in New Jersey.
- L. caryæ* Fitch. N. Y., and probably in New Jersey.
- L. corylifex* Fitch. N. Y., and probably in New Jersey.

Sub-family DIASPINÆ.

ASPIDIOTUS Bouché.

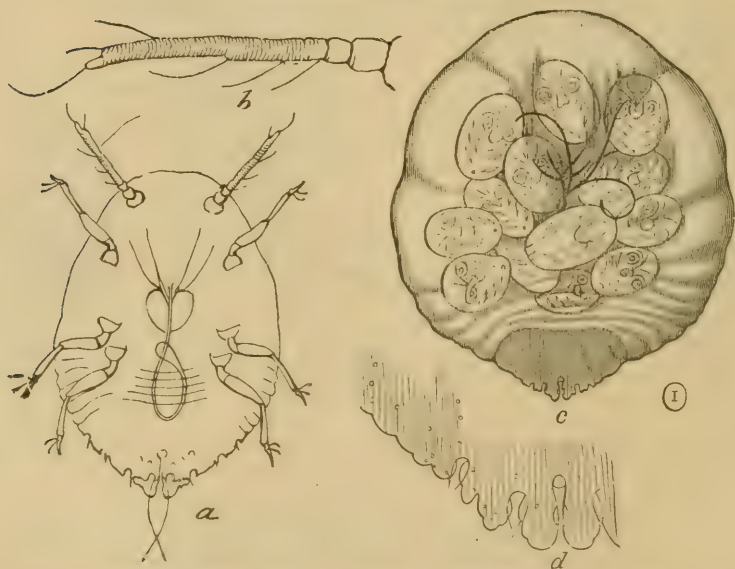


Fig. 52.—*a*, larva of pernicious scale; *b*, its antenna; *c*, adult female showing embryos through body wall; *d*, tip of anal plate of female: all greatly enlarged.

- A. abietis* Schr. On hemlock at Ithaca, N. Y. A species which Mr. Marlatt finds practically indistinguishable in the stage examined was found in large numbers on a cranberry bog near Brown's-Mills-in-the-Pines, in July.

- A. nerii* Bouclé. In Europe and America, widely distributed, on Oleander and other garden plants.
- A. ostreæformis* Curt. A European fruit scale, which has been several times found in the Eastern U. S., recently, according to Dr. Howard: it is at least as likely to occur in New Jersey as elsewhere.
- A. ancylus* Putn. Occurs occasionally on apple in all parts of the State, usually introduced on nursery stock: it is not an injurious species with us.
- A. comstockii* Johns. On sugar maple, Ills. and N. Y., will no doubt be found in New Jersey when sought for.
- A. forbesi* Johns. On cherry, apple, pear, plum, quince, currant, &c.: occasionally found on nursery stock, but not, thus far injurious in our State.
- A. juglans-regiæ* Comst. On locust, pear and cherry; New York, D. C., and probably also New Jersey.
- A. perniciosus* Comst. The "San Jose" Scale: occurs on a large variety of trees, shrubs and plants causing serious injury in many places. It is an introduced species, and has been distributed on nursery stock, chiefly in Monmouth, Burlington and Atlantic Counties. It occurs, however in almost all the other counties of the State in small colonies.
- A. rapax* Comst. Occurs on various trees and is almost cosmopolitan.

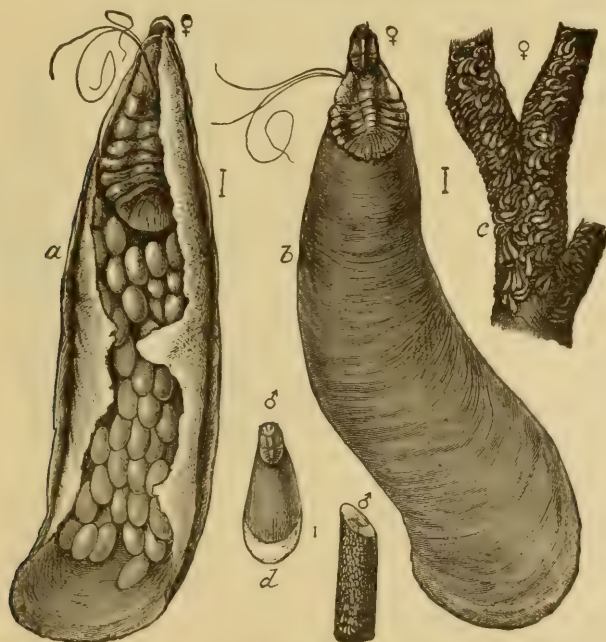


Fig. 53.—Oyster shell bark louse, *Mytilaspis pomorum*.—*a*, female scale from beneath, filled with eggs; *b*, same from above; *c*, twig infested by female scales; *d*, male scale and a twig infested by them; scales greatly enlarged.

CHRYSOMPHALUS Ashm.

- C. tenebricosus* Comst. The "gloomy scale" on red maple, Washington, D. C., and probably in New Jersey as well.
- C. ficus* Ashm. Common in green-houses.
- C. obscurus* Comst. On willow oak found at Washington, D. C., and in the Eastern U. S. generally.

MYTILASPIS Sign.

- M. pomorum* Bouché. The "oyster shell bark louse" common all over the State on orchard trees and sometimes injurious to apple. It also attacks and severely injures lilac and other shrubs, occasionally harms willow, maple and other shade trees, causes also the death of walnut and butter-nut trees in the northern part of the State (Sm). (See Fig. 53.)
- M. citricola* Pack. Found generally on oranges and lemons, in the markets; but does not occur in orchards or indeed except in greenhouses (Sm).
- M. gloverii* Pack. Elizabeth (U. S. Ag). Is in the same case as the preceding.

DIASPIS Costa.

- D. rosæ* Bouché. The "Rose-scale": sometimes abundant on shaded plants, and occurs also on Raspberry when growing in dense rows or clumps.
- D. calyptroides* Costa. A common greenhouse scale on Cactus.

CHIONASPIS Sign.

- C. furfurus* Fitch. The "scurfy scale" or "Harris Louse": occurs on orchard trees, chiefly apple and pear, throughout the State, though rarely causing serious injury
- C. pinifolii* Fitch. Common on pine throughout the eastern U. S., Jamesburg IV, 18 and later near New Brunswick on *Pinus rigida* (Sm).
- C. salicis* Linn. New Brunswick. A willow scale abundant throughout the eastern U. S.

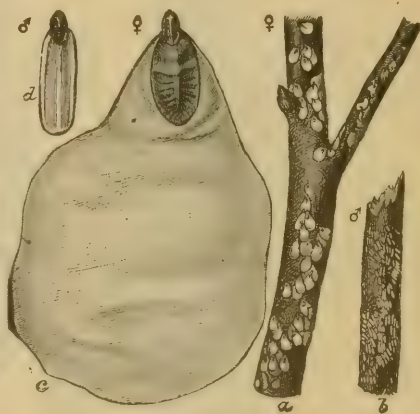


Fig. 51.—Scurfy scale, *Chionaspis furfurus*, a, twig infested by female; b, by male scales; c, female; d, male scale; much enlarged.

ORDER HEMIPTERA.

These are the true "bugs," or half-winged insects, so called because the forewings, which are unfitted for flight, have the base thickened and the tips membranous. This same characteristic also gives them the name *Heteroptera* or different-winged. As explained in the chapter on the development of insects, I prefer the term *Rhyngota* for the series containing the *Thysanoptera*, *Parasitica*, *Homoptera* and *Hemiptera*. The *Homoptera* have certainly developed along lines quite different from the *Hemiptera*, and their life histories as well as the structures show reasons sufficient for their ordinal separation. In the *Hemiptera* the beak is always more free and the head more mobile than in the *Homoptera*, and in many instances the species can direct the beak straight forward so that it projects like a snout. The number of joints in the beak may be three or four, the former being often predatory, the latter usually plant-feeders; but there are many exceptions. The transformations are always incomplete and feeding is always done by piercing and sucking, whether of plant or animal tissues. In the species in which the beak is long and fur jointed, it often bends in the middle when the insect is feeding, the lancets only being inserted and the tip of the beak serving as a guide.

Many injurious and some destructive species are found in this order in which, by the bye, many have peculiar and excessively disagreeable odors.

Our collections in this order are only fair and there are numerous undescribed species. We have a good list by Prof. P. R. Uhler, upon which this record is based, while several individual collectors, notably Messrs. C. F. Seiss, W. T. Davis and F. C. Paulmier, have contributed data.

The MSS. of the list in the *Capsidæ* was submitted to Mr. O. Heidemann, of Washington, D. C., who very kindly added much information. To Mr. Heidemann I am also indebted for determinations in this order, as I am to Mr. Wm. H. Ashmead who has straightened out several difficult groups.

Family CORIMELÆNIDÆ.

The "negro bugs"; black, shining, convex species almost as broad as they are long, the scutell covering almost the entire abdomen so that the wings are scarcely visible. They look like beetles and are found among flowers generally. While not directly injurious, they have the unpleasant habit of laying their eggs on blackberries, raspberries, &c., and this egg has a peculiar "bed-bug" flavor that is intensely repugnant to most people.

CORIMELÆNA White.

C. atra Am. et Serv. Madison (Pr., Staten Island, VI) Ds., Westville, V, 19 Jn., Lahaway in May on Cranberry bogs, Jamesburg, VII, 5 Sm.

C. nitiduloides Wolff. Caldwell (Cr), Anglesea (Ss).

C. lateralis Fab. "New Jersey" (Bt), Staten Island, VII (Ds), Anglesea, V, 28.

C. pulicaria Germ. Madison (Pr), New Jersey (Bt), Camden, March to December (Ss), New Brunswick, VII, 20, Jamesburg, VII, 15, Gloucester Co., VII, 12—common at all points.

Family CYDNIDÆ.

Also black or brown, broadly oval bugs, with the scutel covering a large part of the abdomen; but they are more flattened above and the legs are formed for digging. They are of no economic importance.

CYRTOMENUS Am. et Serv.

C. mirabilis Perty. Woodbury, VII, 29 (Ss), Camden, V, 5 (Jn), Staten Island, VIII (Ds).

PANGÆUS Stål.

P. bilineatus Say. Madison (Pr), Riverton, IV, 16 (Jn), Anglesea, Avalon in June (Ss), New Jersey, III (Ds).

MELANÆTHUS Uhl.

M. robustus Uhl. Anglesea (Ss).

M. picinus Uhl. "Atlantic States" (Uhler).

AMNESTUS Dall.

A. subferrugineus Hope. New Brunswick in April.

A. spinifrons Say. Madison (Pr), Anglesea (Ss), Riverton, IV, 17, V, 1 (Jn), Staten Island, V, VI (Ds), Newark, New Brunswick, IV.

A. pusillus Uhl. Madison (Pr), Merchantville, X, 29 (Ss), New Brunswick, VIII.

CANTHOPHORUS Muls. et Rey.

C. cinctus Beauv. New Brunswick in July.

Family PENTATOMIDÆ.

Large or medium sized bugs with the scutel large, but not covering more than half the abdomen, the wing covers being always well developed and readily observable. They are called "shield-bugs," because of this scutellar structure.

They are firm in texture, broadly oval, the edges of the thorax usually well marked, angulate or even drawn out into spines or spurs, as a whole flattened above. The beak is long, 4-jointed and the species are vegetable feeders as a whole; though some are largely predatory and others seem to take whatever they can get of either plant or animal tissue. Many of them are common, but few of them are really troublesome on cultivated plants. The best known species on the economic side is the Harlequin Cabbage bug, which, fortunately, has not gained a firm foothold in our State, though it occurs sparingly in South Jersey and has once appeared in some numbers in Camden County.



Fig. 55.—A Pentatomid and its beak.

In this family the “buggy” odor is well developed.

Sub-family ASOPINÆ.

STIRETRUS Lap.

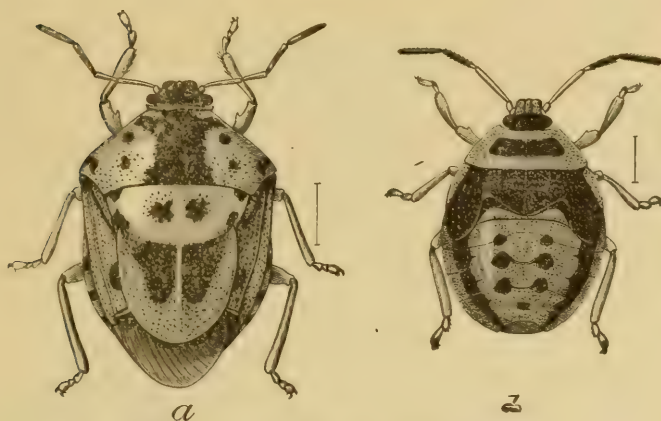


Fig. 56.—*Stiretrus anchora*; a, adult; b, pupa.

S. anchora Fab. Southern N. J. (Sm), Hackettstown (U. S. Ag.), Jamesburg, VII, 4 (Ds). This is a predatory form, sometimes attacking asparagus slugs.

PERILLUS Stål.

P. confluens H-S. Riverton, IV, 16 (Jn), Cramer Hill, VI (Greene).

P. circumcinctus Stål. Merchantville, VI, 29 (Ss), Hackettstown (U. S. Ag.).

P. exaptus Say. Madison (Pr).

MINEUS Stål.

M. bioculatus Fabr. Jamesburg, V, 11.

PODISUS H - S.

P. cynicus Say. Madison, occasional (Pr), New Jersey (Ss), Morris Co. (Jn), Staten Island, VIII (Ds). The species of this genus are also predatory to some extent.

P. placidus Uhl. Madison (Pr), Jamesburg, common.

P. serieventris Uhl. No actual record; but the species is almost certain to occur in the State.

P. spinosus Dall. Madison (Pr), Caldwell (Cr), Avalon, VIII, 2, Riverton, V, 1 (Jn), Marlton, Rutherford (U. S. Ag.), New Brunswick, Jamesburg, common.

P. modestus Dall. Madison (Pr), Staten Island, IV (Ds), New Brunswick, Anglesea, VII, 25, Monmouth Co., VIII, 2, Gloucester Co., VII, not rare.

P. politus Uhl. Anglesea (Ss), V, 28 (Sm), Madison (Pr).

LIOTROPIS Uhl.

L. humeralis Uhl. New Jersey (Jn).

Sub-family HALYDINÆ.

PODOPS Lap.

P. dubius Pal. Beauv. Lahaway, May, common on Cranberry bogs (Sm), New Jersey, III (Ds).

P. cinctipes Say. Camden, Woodbury (Ss), Avalon, VI, 30, Sea Isle City, VII, 22 (Jn).

P. sp indet. Anglesea (Sm).

BROCHYMENA Am. et Serv.



Fig 57.—A tree-bug, *Brochymena arborea*; upper and under surface.

- B. arborea* Say. Madison (Pr), Caldwell, common (Cr), Orange Mts., Camden (Ss), Riverton, VIII, 21—IX, 5 (Jn), Staten Island, IX (Ds), Newark (U. S. Ag).
- B. quadripustulata* Fab. Westville, IV, 25 (Ss), Riverton, III, 6, 20 (Jn); these are the tree-bugs, large, rough and angular in appearance, noticed late in fall, early in spring and occasionally in winter; they are not injurious.
- B. annulata* Fabr. Madison (Pr), Staten Island, VII, IX (Ds), Union Co., X, 11, Middlesex Co., X, 5, Cumberland Co., X, 4, Lahaway, VIII, I.
- B. harrisii* Uhl. Staten Island, IX (Ds).

Sub-family PENTATOMINÆ.

NEOTTIGLOSSA Kirby.

- N. undata* Say. Cape May, VI, 22.

COSMOPEPLA Stål.

- C. carnifex* Fab. Madison (Pr), Caldwell, rare (Cr).

CEBALUS Stål.

- C. pugnax* Fab. Anglesea (Ss), Burlington Co., VIII, 1.

MORMIDEA Am. et Serv.

- M. lugens* Fabr. Madison (Pr), Caldwell (Cr), Merchantville, Anglesea (Ss), Jamesburg, VII, 15, Lahaway, V, Anglesea, V, 28, VII, 23 (Sm), Staten Island, VI (Ds).

EUCHISTUS Dall.

- E. fissilis* Uhl. Madison (Pr), Anglesea (Ss), Staten Island (Ds), Jamesburg, New Brunswick.
- E. servus* Say. Madison (Pr), Staten Island, VI, IX, X (Ds), Orange Mts., Jamesburg, VII, 11, Middlesex Co., VII, 7, 29, Cumberland Co., May, Anglesea, IX, 4.
- E. tristigmus* Say. Madison, locally common (Pr), Merchantville IV, 12 (Ss), Caldwell (Cr), Clementon, V, 4, VII, 26 (Jn), Staten Island, VII, 9 (Ds), Newark in May.
- E. variolarius* Pal. Beauv. Madison (Pr), Caldwell common (Cr), Staten Island, VII, X (Ds), Riverton, IV, 17 (Jn), New Brunswick, Newark, IX, 1.
- E. ictericus* Linn. Madison (Pr), Camden (Ss), Anglesea, V, 28, IX, 1, Lahaway, VII, Jamesburg, VII, New Brunswick, VII.

CÆNUS Dall.

- C. delius* Say. Madison, occasional (Pr), Orange Mts., VII, 10 (Jn), Staten Island, V (Ds).

HYMENARCYS Am. et Serv.

H. æqualis Say. Madison, rare (Pr).

H. nervosa Say. Clementon, V, 30, Westville, VII, 21 (Jn), New Jersey (Bt)
Staten Island, IV (Ds), Jamesburg, V, 9.

MENECLÉS Stål.

M. insertus Say. Sparta (Ds).

LIODERMA Uhl.

L. senilis Say. Anglesea (Ss), Avalon, VIII, 2 (Jn).

L. belfragei Stål. "United States" (Uhler).

L. ligata Say. Caldwell, rare (Cr).

L. saucia Say. Staten Island, IX (Ds).

TRICHOPEPLA Stål.

T. semivittata Say. Madison (Pr), Camden Co., VI, 29, IX, 30 (Ss), Little Falls, V, Staten Island, VIII (Ds), Lahaway, May, Anglesea, VI, 20, Middlesex, VII, 7, common everywhere.

PERIBALUS Muls.

P. limbolaris Stål. Madison, occasional (Pr), Merchantville, IX, 15 (Ss),
Clementon, VIII, 6, Riverton, IX, 1 (Jn).

HOLCOSTETHUS Fieb.

H. abbreviatus Uhl. Westville, VII, 2 (Jn), South Jersey.

THYANTHA Stål.

T. custator Fabr. Madison (Pr), Clementon, V, 9, Westville, IV, 19, Sea Isle City, VII, 22 (Jn), Anglesea, V, 28, Jamesburg, South Jersey, VII, 2.

MURGANTIA Stål.

M. histrionica Hahn. Westville (Jn), Atlantic Co., occasional, Camden, in destructive numbers in the fall of 1896, but since then only occasional examples have occurred: this is the "Harlequin cabbage bug" to which reference has been already made.

NEZARA Am. et Serv.

N. pennsylvanica DeG. Caldwell (Cr), Anglesea (Ss), Staten Island, IV, IX, XII (Ds).

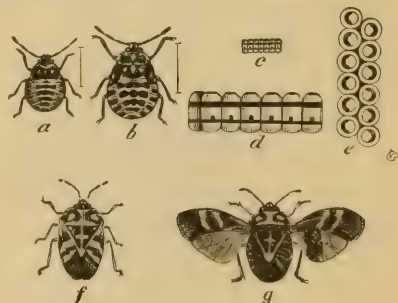


Fig. 58.—The harlequin cabbage bug: *a*, *b*, larva and pupa, natural size; *c*, *d*, *e*, eggs, natural size and enlarged, from side and above; *f*, adult, wings closed and *g*, open; natural size.

N. hilaris Say. Madison (Pr), High Bridge (Ss), Riverton, VIII, 21 (Jn), Staten Island, VIII, X (Ds), Anglesea, New Brunswick, Orange Mts.

BANASA Stal.

B. calva Say. Riverton, VIII, 21 (Jn), Madison (Pr).

B. packardii Stal. Sea Isle City, VII, 22.

DENDROCORIS Uhl.

D. humeralis Uhl. Madison, common (Pr).

Sub-family ACANTHOSOMINÆ.

ACANTHOSOMA Curt.

A. cruciata Say. Madison (Pr), Del. Water Gap VII, 8 (Jn).

A. lateralis Say. Madison (Pr), Anglesea (Ss), Staten Island, IX (Ds).

Family COREIDÆ

Narrower and more oblong than the preceding families the scutellum still of good size ; but by no means prominent or abnormally developed. The common squash-bug is a member of this family and may serve as an example of its general appearance. The hind legs are sometimes abnormally developed, the femora large and clubbed, the tibiæ flattened and with leaf-like expansions. Sometimes the edges of the abdomen are raised at the sides so that the wings lie in a depression. The odors in this family are well developed ; but different from those in the *Pentatomidæ*, being more penetrating and peculiarly sickening. All are vegetable feeders, I believe, the squash-bugs being our injurious examples.

As the insects are of good size and easily seen, much may be done, especially in gardens by hand-picking early in the season. More can be done a little later, even in the field, by picking the prominent masses of large, shining, golden-brown eggs that are laid on the under sides of leaves. Finally, as the insects do not mature until late, rake out and destroy the vines as soon as the crop is all off. This will starve the half-grown examples and leave only few to go into winter quarters.

Insecticides are not indicated.

CHARIESTERUS Lap.

C. antennator Fabr. Madison (Pr.), Ft. Lee (Bt), Camden (Ss.), Farmingdale, VII, 14 (Jn).

CORYNOCORIS Mayr.

C. typhæus Fab. Madison, frequent (Pr).

C. distinctus Dall. Riverton, VII, 3 (Jn), Staten Island, VI (Ds).

ARCHIMERUS Burm.

A. calcarator Fabr. Madison (Pr), Clementon, V, 30 (Jn), Anglesea, VI, 20.

EUTHOCTHA Mayr.

E. galeator Fabr. Madison (Pr), New Jersey, not common (Bt), Westville, IV, 19 (Jn), Staten Island, VI, 9 (Ds), Orange Mts., Anglesea, VI, 25.

METAPODIUS Westw.

M. femoratus Fabr. Caldwell (Cr), New Jersey (Bt), New Brunswick, VI, 1.

M. terminalis Dall. New Jersey (Ss), Riverton (Jn), Staten Island, V, VI (Ds).

LEPTOGLOSSUS Guer.

L. oppositus Say. Shiloh, IX, 1 (Jn), Staten Island, X (Ds).

L. corculus Mayr. Westville, VII, 4 (Jn).

ANASA Am. et Serv.

A. tristis DeG. The common "Squash-bug," found all over the State throughout the season and injurious; it has been already referred to.

A. armigera Say. Merchantville, X, 29 (Ss), Riverton, IX, 5 (Jn), Jamesburg, VII, 4, Port Monmouth, VII, 5, Swedesboro, VII, 12, New Brunswick, IX; also a squash-bug, but not injurious in our State.

ALYDUS Fabr.

A. calcaratus Fab. This should occur in north Jersey.

A. eurinus Say. Madison (Pr), Caldwell, (Cr), Atlantic City, VII, 15 (Jn), Anglesea, Camden (Ss), Staten Island, VII, IX (Ds), Lahaway, IX, 26, Orange Mts, VIII, 7.

A. pilosulus H. S. Madison (Pr), New Jersey (Bt), Woodbury, VI, 23 (Ss), Westville, VII, 17, Riverton, IX, 5 (Jn), Lahaway, VII, 7.

A. quinquespinosus Say. New Jersey (Bt), Madison (Pr), Delaware Water Gap, VII, 8, Riverton, IX, 25 (Jn), Staten Island, VI, IX (Ds), Newark, VII, 11.

A. consperus Mont. Lahaway, VII, 17.

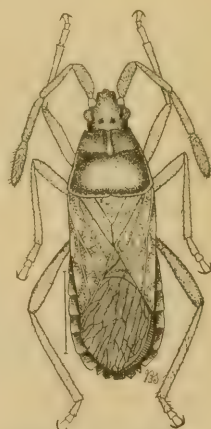


Fig. 59.—The squash-bug, *Anasa tristis*: enlarged.

PROTENOR Stal.

P. belfragei Hagl. "United States" Uhler: will probably be found in the northern part of the State.

HARMOSTES Burn.

H. reflexulus Stal. Madison (Pr), Caldwell (Cr), Camden, VI, 7 to X, 29 (Ss), Clementon, V, 30, Riverton, IX, 25 (Jn), Anglesea, V, 28, South Jersey, common at all points.

H. fraterculus Say. Clementon, VIII, 6 (Jn).

CORIZUS Fall.

C. lateralis Say. Madison (Pr), Merchantville, X, 15 (Ss), Riverton, V, 30 (Jn), Clementon, V, 22 (Viereck), Newark, New Brunswick, South Jersey, Lahaway, V, 20, Anglesea, VI, 28: common at all points.

C. novæ-boracensis Sign. Sandy Hook, rare (Bt).

C. nigrosternum Sign. Camden, Anglesea, (Ss).

C. sidæ Fabr. Caldwell (Cr), Staten Island, X (Ds).

Family BERYTIDÆ.

The "stilt bugs"; very slender in form, with very long legs in which the thighs are clubbed at the tip. The slender antennæ are clubbed at tip and the basal joint is also clubbed. They are rare and, while plant-feeders, not of economic importance.

NEIDES Latr.

N. muticus Say. Almost sure to occur in the State.

JALYSUS Stal.

J. spinosus Say. Caldwell (Cr), Madison (Pr), Riverton, VIII, 21 (Jn), Clementon, V, 22 (Viereck), New Brunswick, IX, 5.

Family LYGÆIDÆ.

Resemble the squash bugs in general form but are usually of softer texture, much smaller in size and sometimes with gay colors. The position of the antennæ lower on the head and the smaller number of nervures on the mem-

brane of the wing afford distinctive structural characters; but these are not easily seen, and, from the practical standpoint it makes no difference, for all the members of this family are also plant-feeders.

The important economic species is the "cinch-bug," which, in some western States, inflicts enormous injury on wheat and corn crops. Fortunately the species is very rare and never injurious in our State, hence no reference to methods of treatment need be made: indeed, though we have a goodly number of species, and some of them are quite common; yet as it happens, none of them occur so as to do notable injury on our staples. Should any of them ever require treatment, the contact insecticides would have to be resorted to.

NYSIUS Dall.

- N. angustatus* Uhl. Camden, IX, 30, X, 15 (Ss), Westville, V, 20 (Jn), Anglesea, V, 28, Lahaway, common on cranberry bogs in May.
N. providus Uhl. Madison, common (Pr).

BELONCHILUS Uhl.

- B. numenius* Say. Anglesea (Ss).

ORSILLUS Dall.

- O. scolopax* Say. Madison (Pr), Jamesburg, VII, 15.

ISCHNORHYNCHUS Fieb.

- I. didymus* Zett. Madison (Pr), Camden, III, 27, Atco, IV (Ss), Riverton, VIII, 21 (Jn), Jamesburg, VII, 15, Anglesea, VII, 24.

CYMUS Hahn.

- C. luridus* Stal. Madison, frequent (Pr), Jamesburg, VII, 15.
C. angustatus Stal. Camden, IV, 22, XI, 27, Anglesea (Ss), VII, 4 (Jn), Jamesburg, VII, 15.
C. claviculus Hahn. Clementon, V, 30 (Jn), Camden, XI, 27, Merchantville (Ss).

CYMODEMA Spin.

- C. tabida* Spin. Madison (Pr), Anglesea, V, 25, Lahaway, in May, on Cranberry bogs: not rare.

ICHNODEMUS Fieb.

- I. falicus* Say. Lahaway, common on cranberry bogs in May.

BLISSUS Burm.

- B. leucopterus* Say. The "Chinch-bug." Caldwell, rare (Cr), New Jersey (Bt), Camden, IV, 22 (Ss). This species, so destructive in many of the western and some southern States, is fortunately very rare with us.

GEOCORIS Fall.

G. punctipes Say. Madison, rare (Pr), Merchantville, X, 29 (Ss), Riverton, IX, 25 (Jn).

G. fuliginosus Say. Madison (Pr), Camden, Oct. to Dec. (Ss).

G. piceus Say. Madison, occasional (Pr), Camden County, XI, 2; (Ss).

G. bullatus Say. Ranges from the D. C. to Nova Scotia, and sure to be found in New Jersey.

It is very probable that *limbatus* Stål, *griseus* Dall. and *borcalis* Dall. will yet be found, in addition to the above.

CEDANCALA Am. et Serv.

C. dorsalis Say. Madison (Pr), Jamesburg, VII, 15, Lahaway in May, on cranberry bogs.

CROPHIUS Stål.

C. disconotus Say. "United States" (Uhler).

LIGYROCORIS Stål.

L. sylvestris Linn. Staten Island (Ds).

L. constrictus Say. Madison (Pr), Camden IX, 30 (Ss).

MYODOCHA Latr.

M. serripes Oliv. Madison (Pr), Camden, Oct. to Dec. (Ss), Staten Island, III, V (Ds), Southern New Jersey, Lahaway, VII, 9.

HERÆUS Stål.

H. plebejus Stål. Camden, common, November and December (Ss).

H. insignis Uhl. "United States" (Uhler).

H. orbicollis Uhl. Lahaway in May, on cranberry bogs.

PAMERA Say.

P. bilobata Say. Camden, common, November and December (Ss).

P. basalis Dall. Madison (Pr), Merchantville, Camden.

P. vicina Dall. "United States" (Uhler).

OZOPHORA Uhl.

O. picturata Uhl. Camden Co., (Ss), Riverton, VIII, 21 (Jn), Anglesea, VII, 23.

PTOCHIOMERA Say.

P. nodosa Say. "United States" (Uhler).

CNEMODUS H. S.

C. mavortius Say. "United States" (Uhler).

TRAPEZONOTUS Fieb.

T. nebulosus Fall. Camden in December (Ss).

T. rufipes Stal. "United States" (Uhler).

EMBLETHIS Fieb.

E. arenarius Linn. Westville, VIII, 18 (Jn).

PERITRECHUS Fieb.

P. fraternus Uhl. Lahaway on Cranberry bogs in May.

DOROCHOSA Dist.

D. illuminata Dist. Have seen this from the State ; but have no record.

GONIANOTUS Fieb.

G. marginepunctatus Wolff. "United States" (Uhler).

EREMOCORIS Fieb.

E. ferus Say. Madison, occasional (Pr), "New Jersey" (Ss), Staten Island, IV (Ds).

PACHYMERUS Uhler.

P. minutus Uhler. Lahaway, on cranberry bogs in May.

MEGALONOTUS Fieb.

M. unus Say. Avalon, IV, 10.

CRYPHULA Stal.

C. parallelogramma Stal. Camden (Ss).

PELIOPELTA Uhl.

P. abbreviata Uhl. Madison, occasional (Pr), Swedesboro, VII (Sm), Riverton, V, 30 (Viereck).

MELANOCORYPHUS Stal.

M. bicrucis Say. Woodbury, Anglesea, VII (Ss), Clementon, VII, 6 (Jn).

LYGÆUS Fabr.

L. turcicus Fabr. Common, from all recorders, April to October.

ONCOPELTUS Stål.

O. fasciatus Dall. Caldwell (Cr), Riverton, IX, 25 (Jn , Anglesea, Woodbury, VI (Ss', Staten Island, VI, X (Ds).

Family PYRRHOCORIDÆ.

The "Red bug" family: somewhat stouter than the preceding, with contrasting red and black colors differing also in venation of the membrane. We have only one representative which, while a plant feeder, is not injurious.

LARGUS Hahn.

L. succinctus Linn. Clementon, VIII (Jn), Atco, VIII, 27 (Ss), Manchester, VI (Ds), Jamesburg, IX, 4, Lahaway, VI, 7.

Family CAPSIDÆ.

This family contains the "leaf-bugs," or "plant bugs" which are mostly soft in texture, elongate oval in shape, somewhat flattened above, with the membraneous tip of the wings often sloping downward rather abruptly. The colors are green and brown as a rule, but red and black bands, spots or other markings occur not infrequently.

Of this family we have a large number that are common and they do a great deal of harm that is not always recognized; none of them assuming in our State the dimensions of a first-class pest. In the gardens they often pierce the buds of flowers, *e. g.*, roses, and cripple the resulting blossoms, and the tips of plants are not infrequently killed and the shoots crippled. On small fruits they are quite injurious by killing the blossom stalk or even piercing young fruits. In this way much injury is caused that is not easily avoided and which forms a considerable tax. It is not entirely easy to deal with these species. Many winter as adults, hence it is always a good plan to destroy all rubbish, &c, that may serve as a hiding place. Some lay eggs in the stems of plants on which they feed; *e. g.*, the "4-lined plant bug," and these may be reached by intelligent trimming and burning the cuttings. The only satisfactory insecticide when such a one must be used is the kerosene emulsion or mechanical mixture, and this must be used very thoroughly with an understanding of the particular case in hand.

Our collections in this family are only fair, and there will be many additions in the future as well as, probably, some new species. As the list stands now it owes its form to Mr. O. Heidemann, as has been already stated.

BRACHYTROPIS Fieb.

B. calcarata Fall. Madison (Pr), Jamesburg, VII, 15, Lahaway on cranberry bogs in May.

TRIGONOTYLUS Fieb.

T. ruficornis Fall. New Jersey (Uhler).

T. pulcher Reut. Madison, common (Pr), Cape May, VI, 22 (Jn).

MIRIS Fabr.

M. instabilis Uhl. Madison (Pr), Riverton, VIII, 21 (Jn), New Brunswick, Jamesburg, VIII, 15.

LEPTOPTERNA Fieb.

L. dolabrata Linn. Madison (Pr), Staten Island (Ds), Orange Mts., New Brunswick, Jamesburg, VI, 16.

CALLIMIRIS Reut.

C. uhleri Reut. "New Jersey" (U S N M).

COLLARIA Prov.

C. oculata Reut. Anglesea, V, 28, Jamesburg, VII, 15.

RESTHENIA Spin.

R. insitiva Say. Madison, rare (Pr), Del. Water Gap, VII, 15 (Jn).

R. confraterna Uhl. Madison, rare (Pr).

R. insignis Say. Madison, common (Pr), Del. Water Gap, VII, 8, 12 (Jn).

R. circumcincta Say, Del. Water Gap, VII, 8, 12 (Jn), Jamesburg, VII, 15.

ONCEROMETOPUS Reut.

O. nigriclavus Reut. "New Jersey" (Uhler).

LOPIDEA Uhl.

L. media Say. Madison, common (Pr).

L. confluens Say. Del. Water Gap, VIII, 12 (Jn), Staten Island, VI, VIII (Ds).

L. fucicornis Uhl. Southern New Jersey.

LOMATOPLEURA Reut.

L. cæsar Reut. Del. Water Gap, rare, VII, 8 (Jn).

PHYTOCORIS Fabr.

P. eximius Reut. Madison, common (Pr).

P. tibialis Reut. "New Jersey" (Uhler).

P. puella Reut. Madison, common (Pr).

P. pallidicornis Reut. "New Jersey" (Uhler).

P. scrupeus Say. Staten Island, VI (Ds), Camden, VI, 7.

NEUROCOLPUS Reut.

N. nubilus Say. Madison (Pr), Merchantville, VI, 29 (Ss), New Brunswick, VII, 7.

COMPSOCEROCORIS Reut.

C. annulicornis Reut. "New Jersey" (Uhler).

DICHROOSCYTUS Fieb.

D. rufipennis Fall. New Jersey (Uhler).

PARACALOCORIS Dist.

P. instabilis Uhl., Ms. Del. Water Gap, VII, 11 (Jn).

P. inops Say. Jamesburg, VIII, 10.

CALOCORIS Fieb.

C. rapidus Say. Common everywhere from June to September.

C. bipunctatus Fabr. Monmouth Co., "New Jersey" (Uhler).

MEGACÆLUM Fieb.

M. grossum Uhl. "New Jersey" (Uhler).

MELINNA Uhl.

M. fasciata Uhl. Madison, frequent (Pr).

M. modesta Uhl. Madison (Pr), Anglesea, VII, 24.

ONCOGNATHUS Fieb.

O. binotatus Fabr. Common at Staten Island, none at Madison (Pr).

LYGUS Hahn.

L. pratensis Linn. Madison (Pr), Staten Island, IV (Ds), Camden, April to October (Ss), Collingwood, Clementon, Riverton (Jn): this is one of the common plant bugs which is often injurious.

L. invitus Say. Madison (Pr), Camden, VI (Ss), Lahaway in May on cranberry bogs.

L. pabulinus Linn. "New Jersey" (Uhler).

L. monachus Uhl. Burlington County, no date.

L. oblineatus Say. Staten Island, July (Ds).

COCOBAEPHES Uhl.

C. sanguinarius Uhl. "New Jersey" (Uhler).

TROPIDOSTEPTES Uhl.

T. cardinalis Uhl. "New Jersey" (Uhler).

POECILOSCYTUS Fieb.

P. basalis Reut. Reported common everywhere, June to October.

POECILOCAPSUS Reut.

P. lineatus Fabr. Common throughout the State; occasionally troublesome on small fruits, and often so in gardens.

P. goniphorus Say. Madison, frequent (Pr), New Jersey (Ss, Jn), Staten Island, VII (Ds).

P. affinis Reut. Madison, rare (Pr).

P. marginalis Reut. "New Jersey" (Ss).

HADRODEMA Uhl.

H. pulverulenta Uhl. Near Newark, Egg Harbor City (Uhler).

SYSTRATIOTUS Doug. & Scott.

S. americanus Reut. Madison, rare (Pr).

CAMPTOBROCHIS Fieb.

C. nebulosus Uhl. Madison, rare (Pr).

C. grandis Uhl. New Brunswick, Lahaway in May.

CAPSUS Fabr.

C. ater Linn. Madison, frequent (Pr), "New Jersey" (Jn).

ORTHOPS Fieb.

O. pastinacæ Wolf. New Jersey (Uhler).

FULVIUS Stal.

F. anthocoroides Uhl. "New Jersey" (Uhler).

MONALOCORIS Dahlb.

M. filicis Linn. Madison, occasional (Pr), Jamesburg, VII, 15.

BRYOCORIS Fall.

B. pteridis Fall. Massachusetts to Texas.

ECCRITOTARSUS Stal.

E. insignis Reut. Jamesburg, VII, 15.

E. 4-maculatus Guer. Will probably be also found in New Jersey.

HYALIODES Reut.

H. vitripennis Say. Madison, common (Pr), "New Jersey" (Ss, Jn), Jamesburg, VIII, 15.

DICYPHUS Fieb.

D. famelicus Uhl. United States (Uhler).

DIAPHNIDIA Uhl.

D. pellucida Uhl. Madison, rare (Pr).

ILNACORA Reut.

I. malinus Uhl. Madison, occasional (Pr).

I. divisa Reut. "New Jersey" (Uhler).

I. stalii Reut. "New Jersey" (Ss).

MALACOCORIS Fieb.

M. irroratus Say. New Brunswick, VII, 20.

ECTOPIOCERUS Uhl.

E. anthracinus Uhl. "New Jersey" (Jn).

XENETUS Dist.

X. scutellatus Uhl. Madison, rare (Pr).

ORECTODERUS Uhl.

O. obliquus Uhl. United States (Uhler).

CYLAPUS Say.

C. tenuicornis Say. United States (Uhler).

STIPHROSOMA Fieb.

S. stygica Say. Madison, rare (Pr).

DIOMMATUS Uhl.

D. congrex Uhl. Madison, rare (Pr).

PILOPHORUS Hahn.

P. amœnus Uhl. Riverton, VIII, 21 (Jn).

P. confusus Kirschb. "New Jersey" (Uhler).

EUCEROCORIS Westw.

E. guttulatus Uhl. Madison, rare (Pr).

GARGANUS Stål.

G. fusiformis Say. Madison, frequent (Pr), "New Jersey" (Ss).

ONCOTYLUS Fieb.

O. decolor Fall. Madison (Pr), Jamesburg, VII, 15.

MACROCOLEUS Fieb.

M. coagulatus Uhl. "New Jersey" (Uhler).

APOCREMNUS Fieb.

A. robustus Uhl., Ms. Madison, frequent (Pr).

NEOBORUS Uhl.

N. saxeus Dist. New Brunswick, VI, 9, on ash.

MACROTYLUS Fieb.

M. blatchleyi Uhl., Ms. Madison, rare (Pr).

STRONGYLOTES Reut.

S. saliens Reut. Riverton, X, 9 (Jn).

RHINOCLOA Reut.

R. forticornis Reut. "New Jersey" (Uhler).

PSALLUS Fieb.

P. delicatus Uhl. "New Jersey" (Uhler).

EPISCOPUS Reut.

E. ornatus Reut. Madison (Pr), Camden, IX, 30, Merchantville, VI, 29 (Ss), Riverton, IX, 5 (Jn), New Brunswick, VII, 20, occurs throughout the State.

PLAGIOGNATHUS Fieb.

- P. obscurus* Uhl. Madison (Pr), New Brunswick, VII, 20, common.
P. politus Uhl. Orange Mts., VII, 12 (Jn), Jamesburg.

PHYLUS Fieb.

- P. modestus* Uhl. New Brunswick, rare.

HALTICUS Burm.

- H. uhleri* Giard. New Brunswick, VII, 20, Jamesburg, VII, 15, Swedesboro, VI, 12 (Sm), Madison, frequent (Pr), Camden County, IX, 30 (Ss), Vineland (U. S. Ag).

ATOMOSCELIS Reut.

- A. seriatus* Reut. "New Jersey" (Uhler).

AGALLIASTES Fieb.

- A. suavis* Reut. "New Jersey" (Uhler).
A. associatus Uhl. New Brunswick, VII, 20.

Family ACANTHIIDÆ.

Contains the "bed-bugs," and "flower bugs," all of them predatory, but not all of them, therefore, beneficial. The "bed-bugs" are oval, much flattened, wingless, brown in color and live in beds, feeding upon the inhabitants thereof at night. They may be destroyed by a free use of gasoline forced into the crevices in which they hide, and this may have to be applied two or three times to reach all the specimens as they develop from the eggs that may be in the bed. A more lasting poison is corrosive sublimate dissolved in alcohol. This kills whenever brought into contact with the bugs, and the alcohol, when evaporated, leaves a deposit of a very fine white powder which is extremely poisonous and almost certain death to all the bugs that may come into contact with it.

The plant bugs are winged and the membrane in the wing cover is without veins. There are only a few species, mostly very small, occurring in flowers, and predatory in habit.

LYCTOCORIS Hahn.

- L. domesticus* Schill. Ranges from British America to Texas.

TRIPHLEPS Fieb.

- T. insidiosus* Say. Common throughout the State from March to December, and in all lists.

CARDIASTETHUS Fieb.

- C. luridellus* Fieb. "United States" (Uhler).
C. pergandei Reut. "United States" (Uhler).

ANTHOCORIS Say.

- A. musculus* Say. "United States" (Uhler).
A. antevolens White. "United States" (Uhler).

ACANTHIA Fabr.

- A. lectularia* Linn. The "bed-bug," found throughout the State in all Cities and large towns, though there are some villages that claim to be exempt.

Family TINGITIDÆ.

These are called "lace-bugs," from the peculiar net or lace-like covering of the wings and often of the other body parts as well. This renders them easy of recognition, and under a lens of even moderate power they are very pretty insects.

They are plant feeders and sometimes occur in numbers sufficient to cause some injury to garden plants or shrubs; but as a field pest they are not of importance and in the garden any of the contact poisons applied in a moderately strong mixture will serve to control them.



Fig. 60.—Eggs and nymph of a Tingitid: enlarged.

PIESMA St. Farg. et Serv.

- P. cinerea* Say. Madison (Pr), Merchantville, XI, XII (Ss).

CORYTHUCA Stal.

- C. ciliata* Say. "New Jersey," Philadelphia Neck, IX (Sm).
C. arcuata Say. Madison, common (Pr), Camden, Woodbury, VII, 27—X, 22 (Ss), Riverton, IX, 4 (Jn), Staten Island (Ds), New Brunswick, July.
C. juglandis Fitch. Should occur in Northern New Jersey.

GARGAPHIA Stal.

- G. amorphæ* Walsh. Ranges from N. H. to Texas.
G. tilia Walsh. Ranges from N. Y. to Virginia.

LEPTOSTYLA Stal.

- L. oblonga* Say. Lahaway, in May, on Cranberry bogs.
L. tabida H. S. "United States" (Uhler).

PHYSATOCHILA Fieb.

P. plexa Say. Madison, occasional (Pr).

LEPTOPHYA Stål.

L. mutica Say. Madison, rare (Pr).

TINGIS Fabr.

T. clavata Stål. "United States" (Uhler).

TELEONEMIA Costa.

T. elongata Uhl. "United States" (Uhler).

Family ARADIDÆ.

This family contains the "flat-bugs," so named because of their form, which is adapted to live in the narrowest sort of crevices, under bark or in chinks of dead trees. They are of no economic importance.

ARADUS Fabr.

A. æqualis Say. "United States" (Uhler).

A. robustus Uhler. Staten Island, IV (Ds).

A. similis Say. "United States" (Uhler).

A. acutus Say. "United States" (Uhler).

A. cinnamomeus Panz. Westville (Ss), Staten Island, IV (Ds).

A. quadrilineatus Say. "United States" (Uhler).

A. breviatus Berg. New Brunswick, IV.

A. rectus Say. Flatbush, Long Island, to Texas.

A. lugubris Fall. Staten Island (Ds).

A. inornatus Uhl. Lahaway, VII, 3.

A. n. sp. Da Costa, VI, 2 (Jn).

BRACHYRHYNCHUS Lap.

B. granulatus Say. "United States" (Uhler).

B. simplex Uhler. Staten Island, V (Ds).

NEUROCTENUS Stål.

N. simplex Uhl. Clementon, Camden, III (Ss), Camden, II, 26, Woodbury, III, 29 (Kp), Jamesburg.

Family PHYMATIDÆ.

PHYMATA Latr.

P. wolffi Stal. Occurs throughout the State, June to September.

P. acutangula Guer. Occurs with the preceding. These two species may be found at all times during the summer on flowers, lying in wait for insects that visit there: they are somewhat injurious because they attack and kill honey bees. In form they are chunky, irregular, with small head, angulated body and very large fore-legs, modified for grasping.



Fig. 61.—Grasping legs of Reduviids, *a*, and *Phymata*, *b*, enlarged.

Family NABIDÆ.

These are yellowish or black, rather flattened bugs, predatory in character, found on flowers and among vegetation generally, seeking what they may devour. They are undoubtedly useful in destroying many small species that might otherwise prove injurious.

NABIS Latr.

N. fusca Stein. "United States" (Uhler).

PAGASA Stal.

P. pallipes Stal. Madison, occasional (Pr).

CORISCUS Schrank.

C. subcoleoptratus Kirby. Madison, common (Pr), New Jersey (Ss), Staten Island, V (Ds).

C. annulatus Reut. Madison, common (Pr), Riverton, IX, 11 (Jn).

C. rufusculus Reut. Have seen it from N. Y. to Virginia.

C. ferus Linn. Common everywhere, and reported on all lists from April to December.

C. inscriptus Kirby. Occurs from Canada to Virginia and California.

C. punctipes Reut. "United States" (Uhler).

C. vicarius Reut. "United States" (Uhler).

Family REDUVIIDÆ.

Called the "Pirate bugs" or "Assassin bugs" from their predatory habits. They have long legs, the anterior often enlarged for grasping, a long, very narrow head with small though prominent eyes and a short, very stout curved beak, which is rigid and cannot be folded back against the head. These characteristics and especially those of head and beak render this family an easily recognizable one. Their predatory habit renders them decidedly useful and, from the fact that quite a number of them have become adapted to life in cities, they are of essential service in keeping down shade-tree pests.

Most of them resent being handled and will, if they get the chance, puncture the hand or, if they happen to alight on an exposed surface and are disturbed, they may "bite" on general principles. The bite is severe and poisonous, often causing intense pain and more or less swelling which may persist for a long time, while local effects may be noticeable for months.

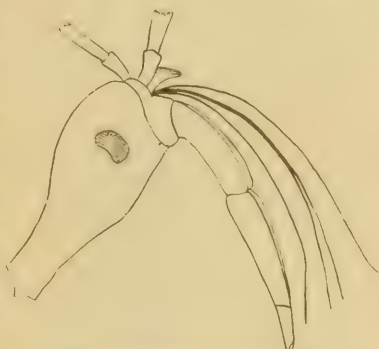


Fig. 62.—Head and mouth parts of a Reduviid; enlarged.

During the summer of 1899 numerous cases of bites from "kissing bugs" were reported in the newspapers, a few of which had an undoubted basis of fact. One species, not yet taken in New Jersey, is common in the Southern States, where its popular name, "the big bed-bug," sufficiently explains its habits. Another species that lives in houses has the more satisfactory habit of feeding upon flies, moths and bed-bugs; but this is rarely seen, because of its habit of covering itself with dust and odd fibres so that it looks like the little masses of dust that will escape the broom in corners and along the wall.

SINEA Am. et Serv.

S. diadema Fabr. Madison (Pr), Westville, VI, 19, Glassboro, VII, 22 (Jn), Merchantville, V, 29 (Ss), Staten Island, VIII (Ds), New Brunswick, all summer, feeding on the larvæ of the elm-leaf beetle and other shade-tree pests.

ACHOLLA Stål.

A. multispinosa DeG. Madison (Pr), Riverton, IX, 5 (Jn), Staten Island, VIII (Ds), Atlantic County, VI, 24, Middlesex, VII, 7.

PRIONIDUS Uhl.

P. cristatus Linn. The "wheel-bug," Princeton, frequent (Pr), and occurs throughout South Jersey not uncommonly, more rarely to the north: the egg masses are frequently found on fruit trees, especially peach, and the bugs feed on all sorts of soft larvæ.

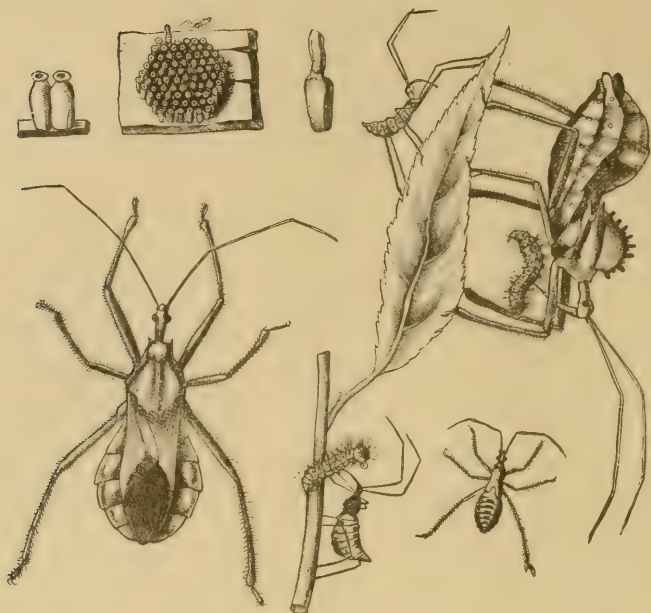


Fig. 63.—The “wheel-bug,” *Prionidus cristatus*, in all its stages; natural size, except the individual eggs, which are enlarged.

HEZA Am. et Serv.

H. annulicornis Stål. New Brunswick, VII, 24.

MILYAS Stål.

M. cinctus Fabr. Madison (Pr), Caldwell (Cr), Camden, IV, 25, Atco, IX (Ss), Avalon, VI, 30, Glassboro, VII, 14, Del. Water Gap, VII, 15 (Jn), Manchester, IX, Staten Island, IX (Ds).

DIPLODES Am. et Serv.

D. luridus Stål. Del. Water Gap, VII, 8 (Jn), Woodbridge, VI, Staten Island, VI (Ds), Jamesburg, VI, Lahaway, VII, 1, Burlington County.

APIOMERUS Hahn.

A. crassipes Fab. Del. Water Gap, VII, 14 (Jn), Anglesea (Ss), Atlantic City, VII, 19.

ECTRICHODIA St. Farg. et Serv.

E. cruciata Say. Anglesea (Ss, Sm).

SIRTHENEA Spin.

- S. carinata* Fab. Woodbury, VI, 22, from globes of electric light (Ss, Jn), Lahaway, V, 28.

MELANOLESTES Stål.

- M. picipes* H. S. Madison (Pr), Atco, IV, 29, Collingwood, V, 4 (Ss), Staten Island, IX (Ds), Lahaway, VII, 5, Hightstown, New Brunswick; has made a temporary stir in the newspaper world as the "kissing bug."
- M. abdominalis* H. S. Madison (Pr), Caldwell (Cr), Camden, IX, 30 (Ss), Staten Island (Ds), South Jersey, VII.

OPSICÆTUS Klug.

- O. personatus* Linn. Staten Island (Ds), Orange Mts., no date; this is the species living in houses and known as the "bed-bug hunter."

PNIRONTIS Stål.

- P. infirma* Stål. Camden, VIII, 1 (Ss).

PYGOLAMPIS Germ.

- P. pectoralis* Say. Madison, rare (Pr).

STENOPODA Lap.

- S. culiciformis* Fab. Madison, rare (Pr), Farmingdale, VII, 14 (Jn), Staten Island, VII, (Ds), Anglesea, VI, 28, Sandy Hook, VII.

NARVESUS Stål.

- N. caroliniensis* Stål. Anglesea, VII, 10.

ONCEROTRACHELUS Say.

- O. acuminatus* Say. "United States" (Uhler).

Family EMESIDÆ.

Very slender species with enormously lengthened slender legs, the anterior fitted for grasping. They are called "thread legged" bugs, and are predaceous in habits. Unfortunately they are altogether too rare to be of practical benefit.

EMESA Fab.

- E. longipes* DeG. Madison (Pr), Caldwell (Cr), New Jersey (Ss), Bridgeton, IX, 4.

BARCE Stål.

B. annulipes Stål. "United States" (Uhler).

B. simplicipes Uhl. "Atlantic States" (Uhler).

CERASCOPUS Heineck.

C. errabundus Say. "Atlantic States" (Uhler).

Family LIMNOBATIDÆ.

The "Marsh treaders." Live in wet places on the surface of water or on mud-flats; slender in body with a very long head and long legs. Our only species is of no economic importance.

LIMNOBATES Burm.

L. lineata Say. Madison (Pr), Camden (Ss), in December (Jn).

Family HYDROBATIDÆ.

The "water striders" or "skaters." They are narrow bugs with long legs, the body wider near the middle, which run rapidly on the surface of the water in ditches, ponds, etc., preying upon whatever insects come into their way. They are of no economic importance.

HYGROTRECHUS Stål.

H. remigis Say. Camden, IV, 14 (Ss), Staten Island (Ds), Jamesburg, VIII, 2.

H. conformis Uhl. Morris County (Jn).

LIMNOTRECHUS Stål.

L. marginatus Say. Riverton, V, 1 (Jn), Merchantville, III, 30 (Ss), Madison, common (Pr), Staten Island (Ds).

LIMNOPORUS Stål.

L. rufoscutellatus Latr. Madison, common (Pr).

STEPHANIA White.

S. picta H. S. "United States" (Uhler).

RHEUMATOBATES Bergr.

R. rileyi Bergr. Madison, occasional (Pr).

METROBATES Uhl.

M. hesperius Uhl. "Atlantic States" (Uhler).

Family VELIIDÆ.

Similar to the preceding but much broader, with proportionately shorter legs, the body widest across the thorax, whence they have been called broad shouldered water striders. Their habits are as in the preceding families.

HEBRUS Curtis.

H. americanus Uhl. "Atlantic States" (Uhler).

H. pusillus Burm. "United States" (Uhler).

MICROVELIA Uhl.

M. pulchella Westw. Canada to Tennessee (U. S. N. M.).

MESOVERLIA Muls.

M. bisignata Uhl. "Atlantic States" (Uhler).

RHAGOVERLIA Mayr.

R. obesa Uhl. "Atlantic States" (Uhler).

Family SALDIDÆ.

Small or medium sized bugs along muddy banks or marshes, flying and running rapidly, rather soft in texture, with small head and prominent eyes. Some of them dig in the banks which they inhabit, and none of them are of economic importance.

SALDA Fabr.

S. signoretii Guer. Cape May, VI, 22 (Jn).

S. ligata Say. "Atlantic States" (Uhler).

S. confluens Say. "United States" (Uhler).

S. sphacelata Uhl. "Atlantic States" (Uhler).

- S. coriacea* Uhl. Atco, VI, 18 (Jn), Anglesea, V, 28.
S. anthracina Uhl. "Atlantic States" (Uhler).
S. deplanata Uhl. Westville, V, 2 (Ss), VI, 22 (Jn).
S. interstitialis Say. "United States" (Uhler).
S. orbiculata Uhl. "United States" (Uhler).
S. humilis Say. Madison, rare (Pr).
S. pallipes Fab. Madison, rare (Pr).
S. separata Uhl. "Atlantic States" (Uhler).
S. vagator Uhl. Anglesea (Ss).
-

Family GALGULIDÆ.

Broad, squat bugs with prominent, projecting eyes, called "toad-bugs" because of their resemblance to that animal. They live in marshes and along the muddy banks of streams, and while not rare are of no economic importance.

PELOGONUS Latr.

- P. americanus* Uhl. Staten Island, V (Ds), Lahaway, on Cranberry bogs in May.

GALGULUS Latr.

- G. oculatus* Fabr. Caldwell (Cr), Westville, V, 23 (Ss), Riverton, V, 30 (Jn), Staten Island, VII (Ds), Anglesea, V, 30.
-

Family NAUCORIDÆ.

Resemble the preceding in outline, but more even and without the projecting eyes. They are predatory, the fore legs being developed for grasping, and live in the water, crawling about among the plants. None are of economic importance.

PELOCORIS Stål.

- P. femorata* Pal. Beauv. Madison (Pr), Camden, IV, 17 (Ss), Riverton, V, 1, VIII, 14 (Jn), Staten Island.

Family BELOSTOMATIDÆ.

Fig. 64.—Giant waterbug, *Belostoma americanum*.

This family contains the “giant waterbugs”; oval flat creatures with keel-like bodies beneath, short powerful beak, large forelegs fitted for grasping and long, broad hind legs fitted for swimming. At the anal extremity is a short strap-like appendage.

They are predatory in character, feeding on all sorts of aquatic insects, tadpoles and even small fish and become two or more inches in length in some species. At night, at certain seasons, they fly from pond to pond and at this time are often attracted to electric lights in great numbers. For this reason they have been called “electric light bugs,” and occasionally an unusual flight will inspire a reporter to give them a foreign origin, or to invest them with destructive powers—as when in 1899 the “strangling bugs” from South Africa made their appearance near Mt. Holly in great swarms and developed into these bugs.

They are of no importance to the agriculturist.

ZAITHA Am. et Serv.

Z. fluminea Say. Madison (Pr), Camden, Anglesea, Brigantine (Ss), Riverton, V, 1 (Jn), Staten Island, V, VI, VIII (Ds), Orange Mts.

Z. aurantiacum Leidy. Riverton, IX, 5 (Jn).

BELOSTOMA Auct.

B. americanum Leidy. Madison (Pr), Caldwell (Cr), Philadelphia at electric light, very rare (Ss), Staten Island (Ds), g. d. throughout the State.

BENACUS Stål.

B. griseus Say. New Jersey, rare (Bt), New Brunswick occasional (Sm), Philadelphia, at electric light very common (Ss), Hightstown, very common in 1899, and g. d. throughout the State. The two last mentioned species are the “electric light bugs”

Family NEPIDÆ.

Narrow, long-legged water bugs, the forelegs fitted for grasping, the others for walking. A pair of grooved anal bristles keeps the insect in contact with

the outer air and enables it to breathe when walking on the bottom of shallow pools, etc. The term "water scorpions" has been applied to the members of this family.

NEPA Fabr.

N. apiculata Uhl. Staten Island (Ds), Caldwell (Cr), Madison (Pr), Riverton, V, 1 (Jn), Orange Mts.

RANATRA Fabr.

R. fusca Pal. Beauv. Caldwell (Cr), Madison (Pr), Riverton, VIII, 14, IX, 25 (Jn), Orange Mts.

Family NOTONECTIDÆ.

Waterbugs, termed "back-swimmers," because the upper surface is keel-shaped and they swim backs down. They are predatory and can "bite" severely if carelessly handled. They are of no economic importance.

NOTONECTA Linn.

N. insulata Kirby. Da Costa, VII (Jn), Staten Island (Ds).

N. undulata Say. Madison (Pr), Caldwell (Cr).

N. irrorata Uhl. Madison, common (Pr), Staten Island (Ds).

N. americana Uhl. Orange Mts.

ANISOPS Spin.

A. platycnemis Fieb. Madison, common (Pr).

PLEA Leach.

P. striola Fieb. Cedar Lake, Warren Co. (Ss), Clear Lake, IV, 18.

Family CORISIDÆ.

These are "water boatmen," which resemble the preceding in appearance and feeding habits, but are flattened above and swim right side up. None of them are of agricultural interest, and no good collections have been made in New Jersey.

CORISA Geoffr.

- C. calva* Say. Caldwell (Cr), Jamesburg, VI, 16.
- C. tarsalis* Fieb. "Atlantic States" (Uhler).
- C. signata* Fieb. "Atlantic States" (Uhler).
- C. hieroglyphica* Duf. "Atlantic States" (Uhler).
- C. verticalis* Fieb. "Atlantic States" (Uhler).
- C. burmeisteri* Fieb. "United States" (Uhler).
- C. interrupta* Say. "United States" (Uhler).
- C. erichsonii* Fieb. "Atlantic States" (Uhler).
- C. limitata* Fieb. "Atlantic States" (Uhler).
- C. stigmatica* Fieb. "United States" (Uhler).
- C. alternata* Say. "United States" (Uhler).
- C. harrisii* Uhl. Madison, common (Pr).
- C. dispersa* Uhl. "United States" (Uhler).
- C. suffusa* Uhl. "New Jersey" (Jn).
- C. serrulata* Uhl. "New Jersey" (Jn).
- C. expleta* Uhl. Lakewood, VIII.
- C. spec. indet.* Lahaway, V, 28.

ORDER DERMOPTERA.

The members of this little order are popularly known as "earwigs," from a supposed habit of crawling into the ears of persons sleeping outdoors. They are slender, with short wing covers and resemble "rove-beetles" in shape except for a forceps-like process at the end of the abdomen used in tucking the large, elaborately plaited hind wings under the wing covers. The metamorphosis is incomplete and the females of some species brood over their eggs until they are hatched.

Though the species are common and injurious in some European countries they are very rare with us and never troublesome in any way.

Family FORFICULIDÆ.

FORFICULA Linn.

F. aculeata Scudd. Snake Hill, IV and V (Bt).

F. auricularia Linn. The "Ear-wig": a common European species said to have been found near Jersey City and in greenhouses.

SPONGOPHORA Serv.

S. brunneipennis Serv. Has been recorded from New Jersey (Bt).

ANISOLABIA Fieb.

A. maritima Bon. Common at Sandy Hook in July (Sm), Staten Island (Ds), along the Palisades from Fort Lee up the Hudson (Bt), and the species seems to be extending its range.

LABIA Leach.

L. minor Linn. Apparently an introduced species: occurs on Staten Island, V, VIII (Ds), taken at light, New Brunswick, VII, in the sweep-net Lahaway IX, flying near Englishtown, X, 12 (Sm) and at Caldwell (Cr).



ORDER ORTHOPTERA.

This order contains the grasshoppers, katydids, roaches and crickets, by far the greater portion of which are feeders upon vegetation, and therefore actually or potentially injurious. The mouth parts are mandibulate *i. e.*, built for chewing, hence stomach poisons are indicated whenever they can be usefully employed.

In all the species the fore-wings are narrower and of firmer texture than the secondaries and serve as covers merely, not as organs of flight. The secondaries are folded more or less fan-like and usually hidden by the primaries, their general shape being triangular and the texture thin and membranous. The metamorphosis is incomplete, and in some cases where the wings in the adults are short or undeveloped the difference between pupal and adult condition is not readily seen except by the specialist.

My own collections in this order have been fair, and data have been received from a number of other sources. Prof. Lawrence Bruner, of the University of Nebraska, who is authority in this order, has kindly revised the manuscript, and it probably represents very fairly the actual fauna of the order as it occurs in this State. Special acknowledgment should be made to Mr. Beutenmuller's list of the Orthoptera of the vicinity of New York.

Family BLATTIDÆ.

Commonly known as "roaches." They are flattened, soft in texture, with long, slender antennæ or feelers and stout long spiny legs fitted for rapid running. They live in crevices, under bark or stones in the woods or in cracks between boards and other hiding places in houses. Their favorite haunt is



Fig. 65.—The Croton bug, *Phyllodromia germanica* : *a*, minute nymphs just hatched ; *b*, second, *c*, third, *d*, fourth stage ; *e*, adult male, *f*, female with egg case attached ; *h*, adult with wings spread,—all natural size ; *g*, egg case, enlarged.

about sinks or water-pipes whence a small, brown, full-winged form received in New York the name "Croton bug." A much larger species, in which the male has short wings and the female none at all, is known as the "black beetle." Both of these household pests are importations and not original inhabitants; hence there are yet some localities in the State where they are unknown. None of the species are injurious to the agriculturist.

One of their marked peculiarities is the egg sac which develops attached to the end of the female abdomen and is dropped in some concealed place when the eggs are fully mature.

In houses, a liberal use of a mixture of equal parts of sweet chocolate and borax ground together in a mortar is both attractive and fatal, or soft bread or cake dusted with paris green may be used where there are no children who might be endangered.

PHYLLODROMIA Serv.

P. germanica Linn. The "Croton bug" or small "cockroach": common in houses all over the State in cities and large towns; locally unknown in villages in almost all parts of the State and not found outdoors.

P. borealis Sauss. Staten Island, under bark (Ds), Greenwood Lake, Ft. Lee district, VI (Bt), Ocean County, VI and VII.

TEMNOPTERYX Bruner.

T. virginica Bruner. Common in woods under stones, IV-X (Bt), Staten Island under bark (Ds), Westville (Ss).

ISCHNOPTERA Burm.

I. unicolor Scudd. Under bark in June (Ds), rather common along the Palisades (Bt), Westville, Clementon (Ss), Anglesea at light, VI, 28, Laha-way under bark, VII, 3.

I. pennsylvanica De G. Under bark, VI, Staten Island (Ds), along the Palisades (Bt), Caldwell (Cr), Westville (Ss), Anglesea, VI, 28.

I. uhleriana Sauss. Anglesea, VI, 20, Newark, no date, Jamesburg, VI.

NYCTIBORA Burm.

N. mexicana Sauss. Has been introduced from tropical America into cities and towns, with bananas (Bruner).

STYLOPIGA Fischer.

S. orientalis Linn. The "oriental roach" or "black beetle" an introduced species common in houses in the cities and larger towns; unknown in favored localities in the interior of the State.

PERIPLANETA Burm.

P. americana Linn. Newark, New Brunswick (Sm), Caldwell (Cr), Staten Island (Ds); probably occurs all over the State.

P. australasia Linn. Should be occasional in cities about shipping (Bruner).

PANCHLORA Burm.

P. viridis Burm. Occasional in cities and towns, imported with tropical fruits (Bruner).

P. exoleta Burm. Comes from the tropics in fruit, and found occasionally in sea-coast cities (Bruner).

LEUCOPHÆA Bruner.

L. surinamensis Fabr. Should be found in hot-houses in cities.

Family MANTIDÆ.

Of these peculiar insects we have only one species that has been taken rarely in the southern section, and another will probably be found by more thorough collecting. They have a very long narrow prothorax and immensely developed forelegs which they use in holding or grasping their prey, for they are carnivorous. The other legs are feebly developed and the body is clumsy. The eggs are laid in masses on twigs and are covered by a fibrous substance which holds them together. Unfortunately they are not numerous enough to be of any economic value.

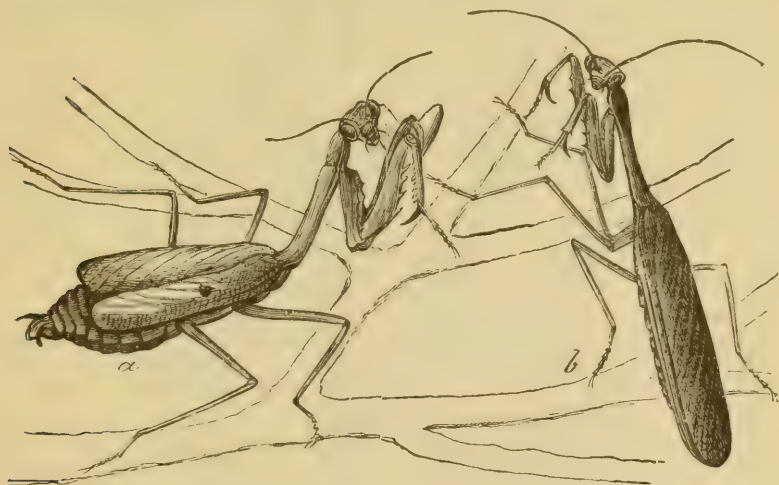


Fig. 66.—*Stagnomantis carolina* : *a*, female; *b*, male; natural size.

STAGMOMANTIS Scudd.

S. carolina Burm. Has been taken in Ocean and Atlantic counties.

S. dimidiata Burm. May be expected to occur in New Jersey (Bruner).



Fig. 67.—Walking stick, *Diaperomera femorata*; *a*, *b*, eggs, enlarged, front and side view; *c*, young just hatching; *d*, male; *e*, female adult.

Family PHASMIDÆ.

These are the "walking sticks"; odd creatures, two inches or more in length, very slender, with very long antennæ and long slender legs which they so dispose as to be practically invisible when at rest to all save the trained eye. No wings are developed in our species which, while it occurs quite generally and sometimes even abundantly, is never injurious. It feeds upon the foliage of shrubs and trees.

DIAPHEROMERA Gray.

D. femorata Say. Abundant on peach trees in Somerset County, New Brunswick, Lakewood, Burlington County (Sm), Caldwell (Cr), Staten Island (Ds), Fort Lee, IX (Bt), High Bridge, some seasons numerous (Ss), Nutley (U.S. Ag).

Family ACRIDIDÆ.

These are the short-horned grasshoppers, perhaps the most common and best known of our insects, flying up or jumping out of the way, however one turns, among grass or low herbage in roads, fields or meadows. The females have four horny valves by means of which they lay their eggs in masses in the ground or in soft or decaying wood, where they may remain all winter or may

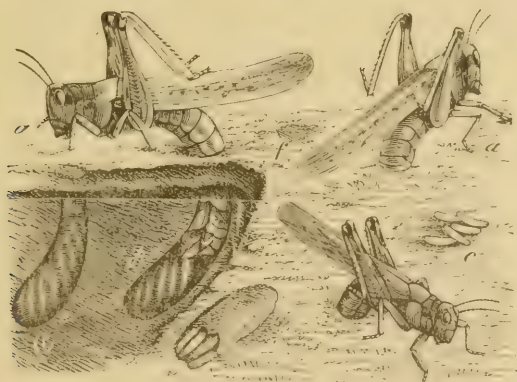


Fig. 68.—Illustrates egg-laying of a grasshopper: *a*, females with abdomen inserted in the soil; *b*, broken egg-pod lying on surface; *c*, individual eggs; *d*, section of soil showing eggs being placed in position; *e*, egg-pod completed; *f*, egg-pod sealed over.

hatch in fall; in which case the partly grown larvæ winter and are sometimes seen on mild days even on the snow. The hind legs are much the longest and formed for jumping, the antennæ in this family rarely exceeding and often not equalling half the length of the body.

Among the grasshoppers are many injurious insects which in some countries take the form of devastating plagues. In New Jersey the insects are held in check by their natural enemies and only in unusually dry seasons do they become at all troublesome on cultivated crops. In these cases the arsenites may be used, and sometimes the bran and paris green bait is the most effective method. Where turkeys are allowed to run they keep down the insects effectively.

TRYXALIS Fabr.

T. brevicornis Linn. Common at Anglesea, IX, 4, in swampy meadows (Sm), Jamesburg, VII, 4 (Ju), Almonesson, IX, 18 (W).

MERMIRIA Stål.

M. bivittata Serv. Common at Anglesea, IX (Sm), Cape May, IX, 24, (Sk), Ocean City, IX (W).

SYRBULA Stål.

S. admirabilis Uhl. Cape May (Sk).

ERITETTIX Bruner.

E. carinatus Scudd. Not yet actually found in New Jersey; but almost certain to occur there (Bruner).

AMBLYTROPIDIA Stål.

A. occidentalis Sauss. Has been taken from Florida to Canada, and there is no reason why it should not occur in New Jersey (Bruner).

ORPHULELLA Giglio-Tos.

O. maculipennis Scudd. var *propinquans* Scudd. Anglesea, common, VIII, IX, Jamesburg, VII. IX, Ocean and Burlington Counties, VIII, IX (Sm), Westville (Ss), Ocean Grove (Cr), Staten Island, July till frost (Ds), Fort Lee (Bt).

This is one of the species that is always common on cranberry bogs and may not be guiltless of occasionally eating into berries.

O. æqualis Scudd. var *bilineatus* Scudd. Jamesburg, on Cranberry bogs, Sandy Hook, Orange Mountains, VII and VIII (Sm), Fort Lee (Bt).

O. olivacea Morse. Sandy Hook, VIII, IX (Bt, Sm), Anglesea, Cape May, VIII, IX (Ss, Sm): none of my specimens have been taken on cranberry bogs and this seems more strictly a sea-coast species.

O. speciosa Scudd. Bound Brook, VIII.

O. pelidna Burm. Described from Pennsylvania and thought by some to be the same as *maculipennis*; but Mr. Bruner does not agree with this and thinks the true *pelidna* yet remains to be found.

CLINOCEPHALUS Morse.

- C. elegans* Morse Ocean County on cranberry bogs, very rare (Sm), Anglesea, IX, 5 (W).

DICHROMORPHA Morse.

- D. viridis* Scudd. var *punctulata* Scudd. Common from July until frost in dry grassy fields, meadows and hillsides, and taken in every county south of the red shale as well as along the Hudson to Fort Lee. I have also taken it on the dams and dry cranberry bogs in Ocean and Monmouth Counties, August and September.

STENOBOTHRUS Fischer.

- S. curtipennis* Harr. var *longipennis* Scudd. Orange Mts., Jamesburg, Ocean County, VIII (Sm), Caldwell (Cr), Staten Island, July until frost (Ds).

CHLOEALTIS Harr.

- C. conspersa* Harr. Fort Lee (Bt); Staten Island, July until frost (Ds), "New Jersey" (Ss).

MECOSTETHUS Fieb.

- M. lineatus* Scudd. Hammonton, VII, Anglesea, IX (Sm), Ocean County (Ss), Fort Lee, VII, 31, one specimen (Bt).
M. gracilis Scudd. Middlesex County, IX, (Sm).

PSEUDOPOMALA Morse.

- P. brachyptera* Scudd. Fort Lee, VII (Bt), New Jersey (Ss).

PAROXYA Scudd.

- P. atlantica* Scudd. Newark : one of the species commonly found on grassy cranberry bogs. Jamesburg, Ocean County, Anglesea, VII-IX (Sm), Staten Island, VII-IX (Ds).
P. floridana Thos.=*recta* Scudd. Occurs with the preceding and under the same conditions.

HESPEROTETTIX Scudd.

- H. brevipennis* Thos "Not uncommon in the cranberry fields of Atlantic County" (Uhler).

MELANOPLUS Stal.

- M. atlanis* Riley. Common from August to frost (Bt) and on Staten Island during same period (Ds) Westville, VIII, 26 (Ss) : in my own experience I have not found this so commonly as others seem to have done.



Fig. 69.—The stages of a grasshopper: *a*, young nymph; *b*, nymph, further advanced; *c*, pupa; *d*, winged adult.

- M. scudderi* Uhl. Middlesex Co, (Sm), Almonesson, IX, 18 (W), "New Jersey," VIII-X (Bt), Staten Island, VIII-X (Ds), Riverton, IX, 5 (Jn).
- M. fasciatus* Wlk. Jamesburg on Cranberry bogs, VII, VIII (Bt), "New Jersey" (Ss).
- M. femur-rubrum* DeG. Common everywhere and at almost all seasons: it is the grasshopper that is almost universally seen.
- M. minor* Scudd. Along the Palisades in dry grassy places, VI and VII (Bt), Atco (Ss), Westville, VI, 19 (Jn)
- M. collinus* Scudd. August and September on dry grassy places (Bt), Jamesburg on Cranberry bogs (Sm), Riverton, IX, 10, (Jn).
- M. differentialis* Thos. Newark, Jamesburg, VII, on Cranberry bogs (Sm), Camden Co. (Ss), Westville, IX, 12 (Jn), Riverton, X, 11 (Rehn).
- M. femoratus* Burm. = *edax* Sauss. Recorded as occurring in New Jersey, but I have no accurate data.
- M. bivittatus* Say. Common in most sections (Ss), New Jersey (Bt), Staten Island, VII-X (Ds), Caldwell (Cr), Newark, Monmouth, Burlington, Atlantic and Ocean Counties on cranberry bogs, Anglesea (Sm), Medford, VIII, 13 (Rehn): it is the clumsiest of our bog species and rarely abundant until after the middle of August.
- M. punctulatus* Uhl. In pine woods, VIII, IX (Bt), Ocean County about cranberry bogs (Sm), "New Jersey" (Ss).

SCHISTOCERCA Stål.

- S. americana* Dru. Fort Lee (Bt), Newark (Ang), Staten Island, VIII-XI (Ds), Anglesea, VI, Lahaway, VII, Lakewood, VIII (Sm), Cape May (Ss): our largest "grasshopper" with very long wings and powerful in flight, whence it is termed the "bird locust." It is closely allied to the famous migratory locust of Egypt.

- S. alutacea* Harr. Staten Island, VIII to X (Ds), Caldwell (Cr), Middlesex Co., VIII (Sm), Clementon, V, 22 (Ss), Glassboro, IX, 19 (Jn).
- S. obscura* Burm. Newark, Caldwell (Cr), from Jamesburg to Cape May, VIII, IX, in scrub-land about cranberry bogs, in marshes and in swamps; the most common of the species of the genus.
- S. rubiginosa* Harr. Occurs with *obscura* under the same conditions and at times hardly less common.

ARPHIA Stål.

- A. sulphurea* Fabr. Ft. Lee (Bt), Staten Island, V-VII (Ds), Caldwell (Cr), Jamesburg, VII, 4, about cranberry bogs (Sm), Camden County (Ss).
- A. xanthoptera* Burm. Fort Lee, VIII IX (Bt), Staten Island, August to frost (Ds), Orange Mountains, VIII, Middlesex Co., X, Lahaway, VIII, Anglesea, IX (Sm), Blackwoods, IX, 19 (Rehn).

CHORTOPHAGA Sauss.

- C. viridifasciata* De G. var *viriginiana* Fabr. var *radiata* Harr var *infusata* Harr. Common throughout the State in all varieties and all the season. Staten Island, April until frost (Ds); nymphs numerous at Westville, XI, 7 (Ss). The partly grown wingless specimens of this species are sometimes seen in winter in considerable numbers, and occasionally attract attention near cranberry bogs.

ENCOPTOLOPHUS Scudd.

- E. sordidus* Burm. New Jersey, IX and X, common (Bt), Caldwell (Cr), Newark, Staten Island, September to frost (Ds), New Brunswick, common, X, 5 (Sm), Westville, Camden (Ss).

HIPPISCUS Sauss.

- H. tuberculatus* Beauv. May until July (Bt), New Brunswick, VI (Sm), High Bridge, V, 5 (Ss), Farmingdale, VII, 15 (Jn).
- H. rugosus* Scudd. Caldwell (Cr), Bound Brook, VIII, Anglesea, VI, Lahaway, VII (Sm).
- H. phœnicopterus* Germ. Caldwell (Cr), New Brunswick, Lakewood VIII (Sm), Atco, VI, 21 (Ss).
- H. compactus* Scudd. Bound Brook, VIII, common (Sm).

CIRCOTETTIX Scudd.

- C. verruculatus* Kirby. Del. Water Gap, VII (Ds, Ss), VIII, IX (Ds), Dover, VII, 15 (Jn).

DISSOSTEIRA Scudd.

- D. carolina* Linn. Common throughout the State, VI to XI.

PSINIDIA Stål.

- P. fenestralis* Serv. = *eucerata* Uhl. On sandy meadows and scrub-land, near beaches and in open places in pine woods throughout the southern part of the State from late July to October. Recorded by Messrs. Crane, Beutenmuller, Davis, Johnson and Seiss, and taken in many localities by myself.

TRIMEROTROPIS Stål.

- T. maritima* Harr. Along the shore from Staten Island and Sandy Hook to Cape May and up the Delaware Bay to Bayside, from June to September. It frequents the reedy meadows just back of the shore, is a ready flyer and quite difficult to capture.

SPHARAGEMON Scudd.

- S. æquale* Scudd. Ocean Grove (Cr), Jamesburg on cranberry bogs (Sm), not rare in the sandy districts of New Jersey (Bt).
S. bollii Scudd. Caldwell (Cr), Fort Lee, VII-X (Bt), Staten Island, VI-X (Ds), Jamesburg, about Cranberry bogs, VIII, IX (Sm).
S. balteatum Scudd. New Brunswick, Jamesburg, Anglesea, IX (Sm), Staten Island (Ds): this may be the same as *bollii*, but Prof. Bruner prefers to consider them distinct.
S. collare Scudd. Staten Island, VII-XI (Ds), Jamesburg on cranberry bogs (Sm).
S. saxatile Morse. Newfoundland, IX (Ds, Bt), "New Jersey" (Ss).

SCIRTETTICA Sauss.

- S. marmorata* Harr. Sandy Hook, Toms River and open places in the pine district (Bt), Staten Island, VIII-X (Ds), Ocean Grove (Cr), Jamesburg, Lakewood, Lahaway, VIII, Anglesea, IX (Sm), Atco (Ss).

NOMOTETTIX Morse.

- N. cristatus* Harr! Staten Island, IV-X (Bt), Caldwell (Cr), Camden, Anglesea (Ss); this and the remainder of the species in the family are the "grouse locusts."
N. carinatus Scudd. Staten Island, IV: occurs with and is sometimes considered a long-winged form of the preceding.

TETTIGIDEA Scudd.

- T. lateralis* Say. Taken from April to September in New Jersey (Bt) and Staten Island (Ds): also recorded by Mr. Seiss.
T. polymorpha Burm. Staten Island, IV-X (Ds).

TETRIX Fischer.

- T. ornatus* Say. Caldwell (Cr), Staten Island, IV-IX (Ds); Camden County (Ss).
- T. triangularis* Scudd. Occurs with *ornatus* according to Beutenmuller, who considers it a variety.
- T. granulatus* Kirby. Recorded doubtfully from Staten Island, IV-IX, by Davis, and also noted from New Jersey by Seiss.
- T. cucullatus* Scudd. "New Jersey," IV-IX (Bt), Del. Water Gap, VII, Glassboro, IX, 19 (Jn).

Family LOCUSTIDÆ.

These are the long-horned or meadow grasshoppers and the katydids. They are generally green in color. The antennæ are thread-like and much longer than the body: sometimes two or three times as long. The hind legs are also formed for leaping, but are much longer and proportionately more slender than in the *Acrididæ*. In the females the ovipositor is prolonged into a blade made up of four flat portions, the whole sometimes straight, sometimes curved or sickle-shaped. In the males the wing-covers overlap at the base and are modified into a sound-producing organ by means of which they produce either a shrill continuous call or a chirping or rasping which, in one case, forms the call Ka-ty-did, or Ka-ty-did-nt. Only the males are musical; but in both sexes an ear is found on each fore-leg. The head in most of the species is pointed and the mouth parts are well developed, the mandibles especially being long and sharp-pointed. This makes it possible for them to dig into tissue or to eat seeds, as many do, of grasses. Several species occur on cranberry bogs and some eat into the berries to get at the seeds; species of *Scudderia* being the chief offenders. The most practical remedy in this case is a flock of turkeys, which will keep down the species when young and drive off those that are winged. Insecticides are of no practical value.

The members of this family winter chiefly in the egg stage, the eggs being laid in grasses, reeds, stems of plants, bark of trees, even in the leaves between



Fig. 70.—A species of *Microcentrum*.

the upper and lower layers, the blade or sword-like ovipositors being especially adapted for this purpose. In one case the eggs are laid externally on an edge,

in a series, partly overlapping each other. Except as above mentioned, none of the species are economically important in New Jersey.

We have a few wingless forms that live in cellars, caves and dark places generally which, from their humped shape, are sometimes called "camel crickets." All our species belong to the genus "*Ceutophilus*," and this is the least known of those occurring in our State.

CEUTOPHILUS Scudd.

- C. gracilipes* Hald. In dark cellars and barns, under stones and in hollow trees (Bt), noted in New Jersey (Ss).
- C. grandis* Scudd. Found in West Farms New York, but is a more southern species and probably occurs in South Jersey.
- C. terrestris* Scudd. Should be found in New Jersey (Bt).
- C. lapidicolus* Scudd. Caldwell (Cr), New Jersey (Ss).
- C. uhleri* Scudd. Fort Lee (Bt), Staten Island, IX (Ds).
- C. blatchleyi* Scudd. Should be certainly found in New Jersey (Bt).
- C. latens* Scudd. Same record as the preceding.
- C. neglectus* Scudd. Fort Lee (Bt).
- C. maculatus* Harr. Fort Lee (Bt), Morris Plains (Jn), New Jersey (Ss).

CYRTOPHYLLUS Burm.

- C. concavus* Harr. The well-known "Katydid," whose song is heard from late July until frost everywhere in the State: it was actually a nuisance at the Delaware Water Gap in August, and as a whole the species is perhaps more abundant in the northern half of the State.

AMBLYCORYPHA Stal.

- A. oblongifolia* De G. New Jersey from August until frost (Bt), Newark, Lahaway, IX, (Sm), New Jersey (Ss), Staten Island, VIII (Ds).
- A. rotundifolia* Scudd. From late July to late September (Bt), Staten Island, VIII (Ds), New Jersey (Ss).
- A. uhleri* Bruner. Not actually taken; but Prof. Bruner thinks it occurs within the State.

MICROCENTRUM Scudd.

- M. laurifolium* Linn.

M. retinervis Burm. These species are not generally distinguished in collections; but Prof. Bruner says they are really distinct. Both occur in this State and probably those from the southern, sandy region are *laurifolium*, while the more northern forms are *retinervis*. They occur in September and October.

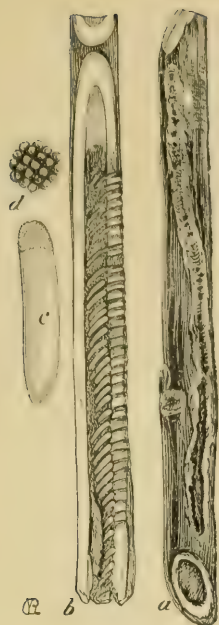


Fig. 77.



Fig. 73.

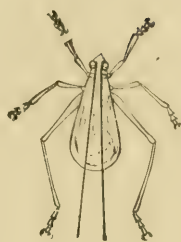


Fig. 75.



Fig. 72.



Fig. 71.



Fig. 76.

Fig. 71.—The true Katydid, male; showing the stridulating area at base of forewings.

Fig. 72.—Eggs of *Microcentrum*; *a*, from the front; *b*, from side.

Fig. 73.—Field cricket, male and female.

Fig. 75.—Tree cricket, male, from above.

Fig. 76.—Tree cricket, female, from side.

Fig. 77.—Eggs of tree cricket in raspberry cane; *a*, appearance of the punctures from without; *b*, cane split to show eggs in position; *c*, individual egg greatly enlarged.

SCUDDERIA Stal.*

- S. furcata* Bruner. Ft. Lee district (Bt), Jamesburg on cranberry bogs (Sm), New Jersey (Ss), Staten Island, VIII XI (Ds).
- S. furculata* Bruner. Caldwell (Cr), Riverton, IX, 10 (Rehn), New Brunswick, Jamesburg, Lahaway, Ocean and Burlington Counties on cranberry bogs, VIII and IX. This species and the next following do serious injury, sometimes, to cranberries just before they ripen, by eating into the fruit to get at the seed which they eat and leave the berry to dry up. A flock of turkeys on an infested bog will make short work of this pest.
- S. curvicauda* De G. Caldwell (Cr), Orange Mts., VIII, New Brunswick, IX, Jamesburg and elsewhere on cranberry, VIII, IX (Sm).
- S. pistillata* Bruner. Occurs with other species, VIII and IX (Bt), "New Jersey" (Ss).
- S. angustifolia* Harr. Occurs with the other species (Bt), "New Jersey" (Ss).
- S. texensis* Scudd. Staten Island, VIII (Ds).
- S. fasciata* Beut. Found on pine trees in Connecticut and New York, and should be found in northern New Jersey (Bt).
- S. truncata* Beut. Vineland (Bt).

CONOCEPHALUS Thunb.

- C. ensiger* Harr. Fort Lee, July until frost (Bt), Staten Island, VII (Ds).
- C. exiliscanorus* Davis. In salt meadows on *Spartina*, late July until frost (Ds), Hackensack meadows (Bt).
- C. robustus* Scudd. Hackensack meadows (Bt), Staten Island, VIII (Ds), Sea Isle City (Ss), Anglesea, very common in September (Sm).
- C. dissimilis* Serv. Fort Lee, VIII, IX (Bt), Staten Island, VIII (Ds), Westville, IX, 12 (Jn).
- C. retusus* Scudd. Caldwell (Cr). It seems likely that this species is confused with others; Prof. Bruner asserts its distinctness from *dissimilis* and other allied forms.
- C. atlanticus* Bruner. Philadelphia neck, IX, 9 (W), Westville, IX, 12 (Jn).
- C. gladiator* Redt. Philadelphia neck, IX, 9 (W). Sure to occur in N. J. also.

ORCHELIMUM Serv.

- O. glaberrimum* Burm. Caldwell (Cr), Fort Lee district (Bt), Anglesea, IX, 5 (W).
- O. agile* DeG. Jamesburg, Ocean and Burlington Counties. Anglesea, VIII, IX (Sm).

*The names in this genus have not been brought into accord with Mr. Scudder's recent work. The same species may be therefore twice referred to under different names, in two cases.

O. vulgare Harr. Common everywhere (Bt), Staten Island, VII (Ds), Newark, Sandy Hook, Jamesburg, Ocean and Burlington Counties, Anglesea, VIII, IX (Sm), Sea Isle City (Ss), Riverton, IX, 5 (Jn).

This is one of the most common species on Cranberry bogs and may under some circumstances aid the species of *Scudderia* in attacking the berries in an earlier stage. It matures in late July and is found for the balance of the season until frost.

O. concinnum Scudd. Staten Island, VII (Ds), rare in New Jersey (Bt), Anglesea, IX, 5 (W).

O. gracile Harr. Lahaway, on cranberry bogs (Sm).

O. nigripes Scudd. Riverton, IX, 5, 25 (Jn); but a little query as to the species.

XIPHIDIUM Serv.

X. fasciatum De G. Ft. Lee, Hackensack Meadows July to late September (Bt), Caldwell (Cr), Staten Island, VIII, (Ds), Jamesburg, Ocean and Burlington Counties, Anglesea, VIII, IX (Sm), Anglesea, IX, 5 (W).

This and *X. brevipenne* are common on grassy cranberry bogs and may damage young fruit. The nymphs swarm in early June.

X. nemorale Scudd. Along the eastern slope of the Palisades, VIII, IX (Bt).

X. brevipenne Scudd. Hackensack Meadows, July until late fall (Bt), Staten Island, VIII-XI (Ds), with *fasciatum* (Sm), Riverton, IX, 5 (Jn).

X. saltans Scudd.

X. strictum Scudd. The last two species have not been actually taken in New Jersey. Prof. Bruner thinks they should occur in open grassy ground, as the species are very common in Maryland, Virginia, etc.

ATLANTICUS Scudd.

A. dorsalis Burm. Fort Lee, Greenwood Lake, rare (Bt), Staten Island, VIII to X (Ds).

A. pachymerus Burm. Fort Lee, Greenwood Lake, rare (Bt), Staten Island, VI-IX, Woodbridge, Newfoundland (Ds), New Jersey (Ss).

Family GRYLLIDÆ. •

The "Crickets" are distinguishable by the somewhat flattened form, the forewings lying flat on the abdomen, but bent down so as to also cover the sides. In the males the flattened surface of the forewings is modified into a sound-organ with strong veins and glassy or transparent cells. In the female the ovipositor is long and cylindrical, like a stout bristle, this character making the family easily distinguishable from the *Locustidæ* in which the ovipositor is

always blade-like and flattened. The field crickets are usually black or brown in color and live in damp places in fields and meadows, jumping readily and somewhat erratically. They are often very common on cranberry bogs and have been charged with eating into fruit; but I have never convinced myself that they actually do so until it is picked. I have found them under berry crates with partly eaten fruit, but this eating was different from that done on the vines. The shrill music of the cricket is well known and some species come occasionally into houses. The eggs are laid into dry sandy soil late in fall, though some forms winter in the adult stage. As a rule they are omnivorous and occasionally cannibalistic.

The "tree crickets" are white or green in color as a rule, sometimes light reddish or yellowish brown, and as the name indicates they are found on trees and shrubs. These are predatory, feeding largely on plant-lice, and therefore beneficial; unfortunately they lay their eggs in series into soft woody tissue like the shoots of plum, raspberry, &c., and thus do almost as much harm as good. They have never been seriously troublesome in my experience, and perhaps it is a good scheme to do pruning with an eye to cutting out and destroying their egg masses.

TRIDACTYLUS Oliv.

T. terminalis Scudd. Atlantic Highlands, VI (Bt), Staten Island, VI to IX (Ds), Clementon, V, 30 (Ju), Ocean County (Sm).

T. apicalis Say. Not actually recorded from New Jersey; but should occur.

GRYLLOTALPA Latr.

G. borealis Burm. The "mole-cricket": lives in dams and along ditches, and has been recorded as injuring potatoes. Caldwell (Cr), Fort Lee, August until frost (Ds). Bordentown, VII, Anglesea, VI (Sm), High Bridge (Ss).

G. columbia Scudd. Habits like the preceding. Fort Lee, VIII (Bt), Staten Island, August until frost (Ds).

GRYLLUS Linn.

G. abbreviatus Serv. Common everywhere (Bt), Staten Island, maturing in summer and fall (Ds), Caldwell (Cr), on cranberry bogs, where it is supposed to eat into fruit, and almost everywhere, in fall (Sm), Westville, VIII, 19 (Rehn).

G. domesticus Linn. The "Cricket on the hearth": an imported species said to be rare near New York (Bt), and also to occur in New Jersey.

G. luctuosus Serv. Staten Island, maturing in spring and early summer (Ds), Caldwell (Cr).

G. pennsylvanicus Burm. Newark, New Brunswick, Jamesburg on cranberry bogs (Sm), New Jersey (Ss).

G. neglectus Scudd. Caldwell (Cr), New Jersey (Bt), Ocean County on cranberry bogs (Sm).

The relation of these species to each other is by no means satisfactorily settled.

NEMOBIUS Serv.

N. fasciatus De G.=*vittatus* Harr. Common everywhere (Bt), Staten Island late June and July (Ds), Caldwell (Cr), Newark, New Brunswick, Jamesburg on cranberry bogs, Burlington County, X, Ocean County, VIII, Anglesea, IX (Sm), Brigantine (Ss).

N. affinis Beut. Occurs with *fasciatus* from late July until frost (Bt), Staten Island, common (Ds).

PHYLLOSCIRTUS Guer.

P. pulchellus Uhl. Ft. Lee, VIII, IX (Bt), Staten Island, VII-X (Ds), Ocean County, IX (Sm), Riverton, VIII, 14 (Jn).

ANAXIPHUS Sauss.

A. exiguus Say. Staten Island in Salt Meadows on *Iva frutescens*, VIII, IX (Ds), "New Jersey" (Bt Ss).

A. pulicarius Sauss. Not yet actually found in New Jersey : occurs in Delaware and Pennsylvania.

MYRMECOPHILUS Latr.

M. pergandei Bruner. Occurs in ant nests from Massachusetts to Maryland ; but not yet actually taken, because not sought for, in New Jersey.

APITHUS Uhler.

A. agitator Uhler. Riverton IX, 5, 25 (Jn), Anglesea, IX, 9, Bayside, IX, 20 (Sm).

OROCHARIS Uhler.

O. saltator Uhler. Bayside, IX, 21 (Sm), Riverton, VIII, 2, IX, 5 (Jn).

ŒCANTHUS Serv.

Œ. niveus Serv. Caldwell (Cr), Staten Island, VII-XI (Ds), Riverton, VIII, 21, Glassboro, IX, 7 (Jn), New Brunswick, X, 9, g. d.

This and the other species of the genus are "tree crickets" and sometimes do considerable harm by puncturing the twigs for oviposition. Raspberry fields in Warren County, and plum orchards in Mercer County, have been quite markedly harmed by them.

Œ. angustipennis Fitch. Staten Island, VIII-X (Ds), Riverton, VIII, 21, IX, 5, common (Jn).

Œ. fasciatus Fitch. Staten Island, VIII-X (Ds), Newark, Jamesburg, IX, 4, (Sm), Brigantine (Ss).

Œ. nigricornis Wlk. Mr. Beutenmuller reports this as the most common of the species about New York, and taken by him in the northern part of New Jersey. Riverton, IX, 11 (Jn). Westville, IX, 12 (Rehn).

- Æ. 4-punctatus Beut. Staten Island, VII, VIII (Ds), Ft. Lee, Greenwood Lake, Alpine, Tenaflly, &c., on bushes, with the preceding (Bt), Riverton, IX, 25 (Jn).
- Æ. latipennis Riley. Staten Island, IX (Ds), Jamesburg, IX, 4 (Sm), Riverton, VIII, 14 (Jn).
- Æ. pini Beut. Riverton (Jn), and will probably occur in the pine districts near New York (Bt).
- Æ. bipunctatus DeG. Staten Island, VIII (Ds), Riverton, VIII, 21 (Jn).

ORDER COLEOPTERA.

The *Coleoptera* or beetles are recognized by their hard or leathery wing covers, which are laid over the abdomen so that they meet in a straight line down the back, the hind wings being transversely folded beneath them. They have mandibulate or chewing mouth-parts and feed on a very great range of substances, animal and vegetable, as well in the larval as the adult stages: hence many of them are seriously injurious while others are markedly beneficial. The larvæ vary much in shape; but never have more than six functional legs and, in the pupal stage, are inactive; hence the metamorphosis or transformation is complete.

The characters upon which classification is based are in the number of the joints of the feet and in the shape of the antennæ or feelers, the weevils being first separated off by the mouth-parts which are set at the end of a longer or shorter beak or snout.

A few general suggestions only can be given here as to the manner in which injurious and beneficial insects may be distinguished.

First, all weevils or snout beetles are plant-feeders and may be or become injurious.

Second, all beetles that have only four apparent joints to the feet or tarsi, the third joint lobed or split, are to be looked upon with suspicion, for they are likely to be either leaf-beetles, like the potato beetle, or wood-borers of the family *Cerambycidae* or long-horned beetles.

Third, beetles with 5-jointed feet or tarsi and the feelers short, with a leaf-like club at the tip, probably belong to the leaf-chafers, like the June-bugs, whose larvæ are white grubs.

Fourth, beetles with 5-jointed feet or tarsi, the feelers long or short with serrated or saw toothed inner edge and the prothorax loosely jointed upon the hinder portions: these are click or snapping-beetles, whose larvæ are wire-worms.

Fifth, beetles with 5-jointed feet or tarsi, the feelers long, slender, the joints similar to each other and not toothed, are probably predatory or beneficial.

Sixth, beetles in which the antennæ are enlarged toward and at the tip or clubbed, are likely to be scavengers and live upon dead or decaying animal or vegetable matter, fungi and the like; but this is subject to many exceptions.

Seventh, beetles in which the hind tarsus or foot is four-jointed while the others have five joints are likely to prove feeders in dead and dying wood or other vegetable tissue; but this is by no means uniform and many exceptions occur, some groups being beneficial while others are injurious.

Our collections in this order are much more complete than in any other save the *Lepidoptera*, for there are many collectors and students in and near the State who have placed their data at my disposal.

Family CICINDELIDÆ.

The "tiger beetles," predatory in habit, long-legged, rather slender, active beetles, running usually in open sandy spots, flying readily when disturbed. The larvæ live in vertical burrows in sandy soil, watching at the mouth for such unwary creatures as come that way. They are of no economic value, because their prey does not consist of injurious insects.



Fig. 78.—Four common tiger beetles: *a*, *Cicindela repanda*; *b*, *C. generosa*; *c*, *C. sexpunctata*; *d*, *C. purpurea*.

CICINDELA Linn.

- C. unipunctata* Fabr. Atco, Woodstown (Li), DaCosta, VII (W). A rare species, partly nocturnal in habit, found running in pine woods along roads before dark (W).
- C. modesta* Dej. Local in Camden, Atlantic Co. (W), Gloucester (W, Li), and Ocean (Sm) Counties, Manchester, VI and IX, Staten Island, IV and X (Ds), Jamesburg, VII, 4, Lahaway, III, 15, IV, 18, V, 21, VI, 28, VII, 2, IX, 20, Greenville, (Sm), near Newark Bay (Bf), Brigantine, mainland (Hn).
- C. rugifrons* Dej. Manchester, IX (Lg), Aqueduct, Long Island, one season very common.
- C. sexguttata* Fabr. Occurs throughout the State in open woods or along shaded roads, and reported by all contributors. It is found from April to July.
 var. *consentanea* Dej. Local, sometimes common: Atco, late VIII and early IX (W, Li), Brigantine, mainland, IX (Hn), Manchester, VI, IX (Lg, Ds).
- C. patruela* Dej. Specimens labelled "N. J." are in the Horn Collection. This has been regarded as a form of *6-guttata*, but Casey considers it distinct,—correctly so, I think.
- C. purpurea* Oliv. Reported from all points, between April and July and again in September, though hardly abundant anywhere.
- C. generosa* Dej. Occurs throughout the State, but somewhat local and rarely in numbers. Reported by all contributors, except in the mountains, every month from April to October.

- C. vulgaris* Say. Generally distributed and locally common throughout the southern counties during the entire season. It is much less abundant and more local north of the red shale line.
- C. repanda* Dej. Common all summer throughout the State and reported by all contributors.
- var. *12-guttata* Dej. Much less common and more local. On mud banks near water (W), Gloucester (Li), Caldwell (Cr), Hackensack Meadows (Bf), Newark.
- C. hirticollis* Say. Common along the coast from Sandy Hook to Cape May from April to September. Extends also along the shores of the Delaware and is local in the sandy districts of South Jersey, especially near swamps.
- C. punctulata* Fabr. Common almost everywhere; but seems locally absent in the Southern Counties. Found even in cities along side streets or in sandy lots, and is attracted to electric lights.
- C. tortuosa* Dej. Atlantic City, three specimens (Li).
- C. dorsalis* Say. Occurs all along the shore from Cape May to Sandy Hook, though not before July (W); also on Staten Island, VII and VIII (Ds). It is also very local inland, on white sand, specimens having been taken at Lahaway in August. The insect varies, locally, and at Squan beach the majority of specimens were almost immaculate.
- C. marginata* Fabr. Common along the coast in salt meadows; Anglesea, VII and VIII (W), Corson's Inlet, VII (Li), South Amboy (Ds), Sandy Hook (Bt).
- C. lepida* Dej. Occurs along the seashore from Sandy Hook to Cape May, but locally, from July to September, and is sometimes common. It also occurs in limited areas inland, Mr. Davis having discovered it at Jamesburg, July 4, where others also found it in numbers later. Another colony is at Lahaway and was discovered by Mr. J. T. Brakeley. Mr. Greene has taken it at Clementon. Mr. Wenzel says the species lives in holes made beneath little tufts of grass.
- C. marginipennis* Dej. Essex and along the Delaware in Northern New Jersey (W).
- C. abdominalis* Fabr. Da Costa, late June (Li), not rare early in July (W).
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Family CARABIDÆ.

The "ground beetles," usually black or dull brown in color, though exceptionally, and on flower loving forms bright blue, green and yellow. The darker forms hide during the day under stones, among roots of plants, in grass at the base of trees, in burrows under ground, usually in sandy places, and in other places of concealment. They fly at night, are often attracted to electric lights, and are predatory in habit, with some unimportant exceptions. The

larvæ are more or less fusiform, somewhat flattened above, dark in color, and live in similar localities as the adults, though more concealed even during the night. They also are predatory in habit and of economic importance from the fact that quite a number of them feed upon the larvæ of injurious species. Thus the species of *Calosoma* destroy many kinds of tree caterpillars and *Lebia grandis* is particularly partial to the eggs of the potato beetle. All these beetles have slender antennæ, 5-jointed tarsi on all feet, and are somewhat depressed or flattened—some of them very much so when they live under bark.

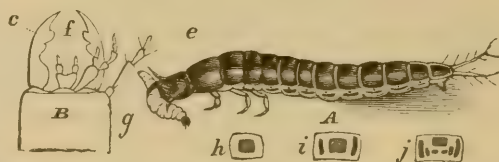


Fig. 79.—Larva of a ground beetle, feeding on a Curculio larva.

OMOPHRON Latr.

- O. labiatum* Fabr. Camden (Li), Westville, along the Delaware, Anglesea (W), Brigantine Beach, IX (Hn).
- O. americanum* Dej. Atlantic County (W), Gloucester (Li), Greenville, VI and IX (Sp), West Bergen in Spring (Bf), Caldwell (Cr).
- O. tessellatum* Say. Anglesea in May, Atlantic County (W).

CYCHRUS Fabr.

- C. nitidicollis* Chev. Lake Hopatcong (Pm); the species of this genus feed upon snails and may be sought for where they are abundant.
- C. stenostomus* Web. Caldwell (Cr), Palisades, V and VI, under stones (Sp), Snake Hill, IV, and all the year round (Bf), Gloucester, Clementon, XII, 17, sifting (W).
- var. *lecontei* Dej. With the type: also Westville (Li), Ft. Lee, IV, XI (Bt).
- C. elevatus* Fabr. Englewood, VII, 1 (Bt), Orange Mts., Woodside, Newark (Bf), Egg Harbor, Anglesea, IV (W, Li); always in single specimens.
- C. viduus* Dej. Hopatcong, VI, 3 (W), Orange Mts. (Bf), Ft. Lee, IV, 21, VI, VIII (Bt), Mays Landing (W, Li): always rare.
- var. *violaceus* Lec. "New Jersey," 1 specimen (Lg).

CARABUS Linn.

- C. sylvosus* Say. Hemlock Falls (Bf), Greenville, VI (Sp), Atlantic Highlands (Bt), Gloucester, Camden Co., (W, Li).
- C. serratus* Say. Throughout the State; often comes to sugar, VIII and IX.
- C. limbatus* Say. Throughout the State, IV, V, VIII and IX.
- C. vinctus* Web. With the preceding and the most abundant of the genus, under stones and logs.

CALOSOMA Weber.

- C. externum* Say. Woodside (Bf), Greenville, under stones, VI and IX (Sp), Gloucester (Li), Camden, Atlantic and Cape May Cos. (W): not common.
- C. scrutator* Fabr. Throughout the State, locally common, often washed up along shore in large numbers, VII, VIII, IX; is a tree climber and caterpillar hunter.
- C. willcoxi* Lec. Newark, at light (Bf), Atlantic City (Li), Cape May Co. (W, Sm); similar in habits to the preceding; but not nearly so abundant.

Fig. 80.—*Calosoma calidum* and larva.

- C. frigidum* Kirby. Newark, light (Bf).
- C. sayi* Dej. Atlantic City (Li), Camden, Gloucester, Atlantic, Cape May Co. (W): rare.
- C. calidum* Fabr. Throughout the State, under stones, etc., in fields; the most common of our species.

ELAPHRUS Fabr.

- E. cicatricosus* Lec. Fort Lee, IV, one specimen (Sf).

- E. fuliginosus* Say. Snake Hill (Li), IV, 24 (Bf).
- E. ruscarius* Say. Throughout the State along dry ditches and on mud flats, V, VI, VII, IX.

BLETHISA Bon.

- B. quadricollis* Hald. Caldwell, rare (Cr).

NOTIOPHILUS Dum.

- N. æneus* Hbst. Ft. Lee, IX, 10, among leaves (Bt), Caldwell (Cr), Camden, Gloucester Co. (W), Newark.
- N. sibiricus* Mots. Madison (Pr), Newark, about roots of trees and under damp leaves (Bf).
- N. hardyi* Putz. Staten Island (Lg), among leaves at base of trees, X, 24, and in Spring (Bt), Newark.

NEBRIA Latr.

- N. pallipes* Say. Throughout the State along rocky streams, under stones just at the edge of the water.

PASIMACHUS Bon.

- P. sublævis* Beauv. Sandy Hook, VIII (Bt), Anglesea, VII, VIII (W, Li, Lv, Sm), Brigantine beach, IX (Hu).

P. depressus Fabr. Manchester (Lg).

P. punctulatus Hald. Egg Harbor, Clementon (Li), Da Costa (W).

SCARITES Fabr.

S. subterraneus Fabr. Throughout the State under stones, all season.

var. *substriatus* Hald. Anglesea, 2 specimens (W).

DYSCHIRIUS Bon.

D. nigripes Lec. Newark (Bf).

D. globulosus Say. Throughout the State: the species are all found near water or under leaves, or burrowing in sandy banks.

D. terminatus Lec. Atlantic City, rare (Li, W).

D. sphæricollis Say. Orange, VI, abundant at light (Ch), Hoboken meadows, IV, IX (Sp), Brigantine beach, salt marshes, IX (Hn), Anglesea, beach front, VII (W).

D. erythrocerus Lec. Newark (Bf), Anglesea, VII, 23.

D. sellatus Lec. Atlantic City, (W, Li), Anglesea (W): strictly a maritime species (Sz).

D. pallipennis Say. With the preceding, also Brigantine beach, salt marshes, IX (Hn).

D. filiformis Lec. Orange, VI, common at light (Ch), Brigantine beach, salt marshes, IX (Hn).

D. pumilus Dej. Orange, VI, at light (Ch), Brigantine beach, salt marshes, IX (Hn).

D. hispidus Lec. Newark district (Bf).

CLIVINA Latr.

C. impressifrons Lec. Orange, at light, VI (Ch), Newark, at light (Bf), Anglesea (W), g. d. (Li).

C. rubicunda Lec. Atlantic City, rare (Li).

C. americana Dej. Orange, VI (Ch), Hoboken meadows, V, IX (Sp), Snake Hill, IV, 26 (Lv), V (Bf), Anglesea (W), Lahaway, V, 28, on cranberry bogs.

C. striatopunctatus Dej. Brigantine beach, salt marshes, IX (Hn).

C. ferrea Lec. Gloucester, not common (W).

C. convexa Lec. Atlantic City, 1 specimen (Li).

C. bipustulata Fabr. Orange, VI, light (Ch), Newark, light, under stones at all times (Bf), Caldwell (Cr), Camden, Gloucester Co. (W), g. d. (Li).

SCHIZOGENIUS Putz.

S. lineolatus Say. Under stones along the Passaic, VI, IX (Sp), Newark, light, VI-VIII (Bf), Camden, Gloucester Co. (W), g. d. (Li).

- S. ferrugineus* Putz. Brigantine beach, salt marshes, IX (Hn), Anglesea, V, 30 (W), Westville (Li).
S. amphibius Hald. Westville (Li), along the Delaware near Camden (W), Anglesea, V, 30.

ARDISTOMIS Putz.

- A. obliquata* Putz. Atlantic City, two or three by Dr. Castle (Li).
A. viridis Say. Clifton, VI (Sp), Newark (Soc), Camden, Gloucester Co., along muddy streams (W), g. d. (Li).

PANAGÆUS Latr.

- P. crucigerus* Say. Snake Hill, under stones, V, VI (Sp), Brigantine beach, IX (Hn), Anglesea, V, 28 (W).
P. fasciatus Say. Madison (Pr), Newark, light (Bf). Ft. Lee, IV, in ant hills (Bt), Snake Hill, under stones, V, VI (Sp), Caldwell (Cr), Atlantic City, wash up (W).

NOMIUS Lap.

- N. pygmæus* Dej. Newark, one specimen (Bf), Avalon, Anglesea (W).

BEMBIDIUM Latr.

- B. inæquale* Say. Banks of Passaic, V and IX (Sp), Westville (Li), Camden, Gloucester Co., (W), Union Co., IV.
B. punctatostriatum Say. Banks of Passaic, V and IX (Sp).
B. confusum Hayw.=*nitidulum* Dej. Banks of Passaic, V and IX (Sp), "New Jersey" (Hayw).
B. americanum Dej. Banks of Passaic, V, IX (Sp), Newark district, early spring (Bf), Orange, VI (Ch), Gloucester (Li), Camden, Gloucester Co., Westville, I, 28 (W), New Brunswick, along the Raritan.
B. honestum Say.=*antiquum* Dej. Banks of Passaic, V, IX (Sp), Camden, Gloucester Co. (W).
B. chalconum Dej. Banks of Passaic, V, IX (Sp).
B. nigrum Say. Banks of Passaic, V, IX (Sp), Camden, Gloucester Co. (W).
B. grandiceps Hayw. "New Jersey" (Hayw).
B. guexi Chd. "New Jersey" (Hayw).
B. fugax Lec. "New Jersey" (Hayw).
B. ustulatum Linn.=*rupestre* Dej. Ft. Lee (Bt), Snake Hill, IV, 26 (Lv), Newark district (Bf), Gloucester (Li), Camden, Gloucester Co. (W).
B. viridicollis Laf. Newark, salt meadows, V, 8 (Bf).
B. variegatum Say.=*patruelis* Say. Banks of Passaic, V, IX (Sp), Newark, salt meadows (Bf), Gloucester (Li), Camden, Gloucester Co., Westville, I, 28 (W).
B. versicolor Lec. Banks of Passaic, V, IX (Sp), Newark, salt meadows, Orange Mts., VII, 13 (Bf), Camden, Gloucester Co. (W).

- B. contractum* Say.=*constrictum* Lec. Sea-shore, VI (Bt), salt meadows, III, 19 (Bf), Atlantic City (W, Li), Brigantine beach, IX (Hn), Anglesea, VII, strictly maritime (Sz).
- B. pedicellatum* Lec. Generally distributed (W).
- B. quadrimaculatum* Linn. Throughout the State in fields and gardens, all summer.
- B. affine* Say. Newark, salt meadows (Bf), Camden (Li), Westville, I, 28, g. d. (W), Lahaway, V, 28, on cranberry bogs.
- B. anguliferum* Lec. "New Jersey" (Hayw).
- B. assimile* Gyll. Salt meadows, rare (Bf).
- B. semistriatum* Hald. Banks of Passaic, V, IX (Sp).

TACHYS Schaum.

- T. proximus* Say. Banks of Passaic, V, IX (Sp), Orange, VI, light (Ch), g. d. (Li), Camden, Gloucester Co. (W).
- T. scitulus* Lec. Banks of Passaic, V, IX (Sp), Newark, Snake Hill, V, 7, salt meadows (Bf), Orange, Long Branch, V, VI (Ch).
- T. pallidus* Chd. Sea Isle City, VIII, a salt meadows species (W).
- T. occultor* Casey. Brigantine beach, IX (Hn), Anglesea, Sea Isle City, VIII, a salt meadow species (W).
- T. lævus* Say. Hopatcong (Pm), Ft. Lee, Snake Hill (Sf), Orange Mts., Arlington, II, 19 (Bf), Anglesea, I, II, Westville, I, 28 (W), Lahaway, V, 28, New Brunswick.
- T. corruscus* Lec. Westville, throughout the winter, sifting (W).
- T. nanus* Gyll. Everywhere under old bark.
- T. flavicauda* Say. Occurs with the preceding.
- T. tripunctatus* Say. Summit, along river (Bt), Highlands, V (Bt), banks of Passaic, V, IX (Sp).
- T. vivax* Lec. Along Delaware river, So. Camden, V, 17 (W).
- T. capax* Lec. Anglesea, sifting, I, II (W).
- T. xanthopus* Say. Newark, Woodside (Bf), Orange, VI (Ch), Anglesea, Westville, I, 20 (W), Ocean Co., on cranberry bogs, V, 28.
- T. incurvus* Say. Banks of Passaic, V, IX (Sp), Orange Mts., in ant hills (Bf), Ft. Lee, ant hills (Bt), Westville, I, 28, g. d. (W), Brigantine beach, IX (Hn).
- T. fuscicornis* Chd. Brigantine beach, IX (Hn).

PERICOMPSUS Lec.

- P. ephippiatus* Say. Orange, VI, common at light (Ch), salt meadows, 1 specimen (Bf).

PATROBUS Dej.

- P. longicornis* Say. Hopatcong (Pm), Ft. Lee (Bt), Newark district, locally common (Bf), Camden, Gloucester Co. (W), g. d. (Li).

POGONUS Dej.

- P. lecontei* Horn. Atlantic City (Castle), Sea Isle City, Anglesea, common on mud flats under the thickened upper crust on salt marshes (W), Corson's Inlet, VII, 20 (Li).

MYAS Dej.

- M. coracinus* Say. Orange Mts., rare (Bf), South Jersey, rare (W).
M. cyanescens Dej. Hopatcong (Pm), Clifton, Ft. Lee, VI, VII (Sp).

TRECHUS Clairv.

- T. chalybeus* Mann. Milltown, VII, VIII, common under dead leaves along a stony brook, with the ant, *Lasius mixtus* Nyl.

PTEROSTICHUS Bon.

- P. adoxus* Say. Hopatcong (Pm), Greenwood Lake, Ft. Lee (Bt), Palisades (Sp), Woodside, Orange Mts., under bark or in rotten wood (Bf), Camden, Gloucester Co. (W, Li), Brigantine, IX (Hn).
P. rostratus Newn. Palisades (Sp), New Jersey (W).
P. diligendus Chd. Palisades (Sp), Newark, salt meadows (Bf).
P. honestus Say. Palisades above Hoboken (Sp, Sm).
P. lacrymosus Newn. Hopatcong (Pm), Orange Mts., VII (Bt), Newark (Soc), Palisades (Sp, Sm).
P. coracinus Newn. Hopatcong (Pm), Ft. Lee (Bt), Orange Mts. (Bf).
P. stygius Say. Throughout the State, locally common, spring and fall.
P. superciliosus Say. Staten Island, rare (Lg).
P. moestus Say. Hopatcong (Pm), Greenwood Lake, Ft. Lee, Highlands (Sf), Orange Mts., V (Bt), IV, always in rotten logs (Bf), Caldwell (Cr), New Brunswick.
P. sayi Brulle. Hopatcong (Pm), Weehawken, IV (Bt), Newark district (Bf), g. d. (W, Li), Lahaway, III, 15, V, 28.
P. lucublandus Say. Throughout the State under shelter of all kinds; one of the few species that lives in tilled fields.
P. ebeninus Dej. Ft. Lee (Sf), Atlantic City one specimen (Li), Westville, Anglesea (W).
P. caudicalis Say. Snake Hill (Bt), Anglesea (W), g. d. (Li).
P. luctuosus Dej. Snake Hill (Bt), Newark, salt meadows (Bf), Westville, II (W), Lahaway, V, 28, on cranberry bogs.
P. corvinus Dej. Hopatcong (Pm), Ft. Lee (Bt), Snake Hill, V, 26 (Lv), Newark (Bf), Palisades (Sp), g. d. (Li).
P. haldemanni Lec. Staten Island, one specimen (Lg), Westville, V, 5, one specimen (W).

P. gravis Lec. Highlands, V, (Sf).

P. purpuratus Lec. Staten Island, one specimen (Lg).

P. tartaricus Say. Hopatcong (Pm), Hoboken (Li), Sea Girt, one spec. (Bf); rare.

P. mutus Say. Throughout the State: common everywhere.

P. erythropus Dej. Throughout the State, locally common.

P. patruelis Dej. With the preceding, though less abundant.

EVARTHURUS Lec.

E. sigillatus Say. Hopatcong (Pm), Greenwood Lake, VI (Sf), Madison (Pr), Caldwell (Cr), Atlantic City, rare (Li).

E. sodalis Lec. Newark district, Sea Girt (Bf).

AMARA Bon.

A. avida Say. Palisades (Sp), VII, 4 (Bt), Snake Hill (Sf), salt meadows (Bf), Westville, Gloucester (Li), Camden Co. (W).

A. fulvipes Putz. Newark (Bf), Atlantic City, Anglesea (Li), common in wash-up in spring (W).

A. exarata Dej. Hopatcong (Pm), Newark, salt meadows (Bf), Caldwell (Cr), Anglesea, common in wash-up (W).

A. latior Kirby. Woodside, salt meadows, rare (Bf), New Brunswick, VII.

A. septentrionalis Lec. Highlands, 1 specimen (Ch).

A. apricarius Payk. "New Jersey" (Li).

A. angustata Say. Palisades (Sp), Ft. Lee (Bt), Newark district in spring (Bf), g. d. (Li).

A. pallipes Kirby. Camden, Gloucester, Atlantic Co. (W).

A. impuncticollis Say. Palisades (Sp), Ft. Lee, VI (Bt), Newark district (Bt), Caldwell (Cr), g. d. (Li, W), New Brunswick, VIII, Anglesea, one of the common species.

A. basillaris Say. Ft. Lee (Bt), Snake Hill, IV (Sf), Newark, salt meadows (Bf).

A. cupreolata Putz. Snake Hill, IV (Sf), "New Jersey" (Hw).

A. fallax Lec. Lake Hopatcong (Pm).

A. polita Say. Orange Mts., one specimen (Bf).

A. interstitialis Dej. Palisades (Sp), Newark (Bf), Camden, Gloucester Co. IV, g. d. (Li).

A. obesa Say. Hopatcong (Pm), Ft. Lee, VII, 4 (Bt), Palisades (Sp), Newark salt meadows (Bf) Highlands, Spring Lake (Ch), seashore (Li), Atlantic City, Anglesea in wash-up, (W), Cape May, VII (Sz).

A. terrestris Lec. Staten Island (Lg).

A. chalcea Dej. Palisades (Sp), Pamrappo, Eagle rock I, 31, salt meadows (Bf), Woodbury (Li).

- A. gibba* Lec. "New Jersey" (Hw).
A. rubrica Hald. Palisades, IX, 27 (Lv), Ft. Lee (Sf), Newark (Soc), Westville, Woodbury (Li), So. Jersey, sandy places under boards (W).
A. subænea Lec. Brigantine beach, IX (Hn).
A. musculus Say. Throughout the State spring and fall, often on herbage, sometimes abundant in September.

LOXANDRUS Lec.

- L. minor* Chd. Anglesea, one specimen (Li).

DIPLOCHILA Brullé.

- D. laticollis* Lec. Palisades, V and VI (Sp), Snake Hill, IV, 26 (Lv), salt meadows (Bf), Hoboken (Bt), Orange, at light, VI (Ch), Atlantic City (Li), Meadows along Delaware, V (W).
 var. *major* Lec. Snake Hill, V, 22 (Bf), Palisades, more rare than the type.
D. impressicollis Dej. Snake Hill, 1 specimen (Sf).

DICÆLUS Bon.

- D. dilatatus* Say. Throughout the State, VI and IX, locally not rare.
D. purpuratus Bon. Also g. d., V, VI, VII and IX; rather rare.
D. ovalis Lec. Snake Hill (Bt), Westville (Li), Gloucester, Camden, Atlantic Co. (W); not common.
D. elongatus Bon. Throughout the State spring and fall: the most abundant of our species, under stones and logs.
D. ambiguus Laf. Hopatcong (Pm), V, 31 (W).
D. teter Bon. Palisade woods (Sp), Ft. Lee, Snake Hill (Bt).
D. politus Dej. Throughout the State, spring and fall.

BADISTER Clairv.

- B. notatus* Hald. Hopatcong (Pm), Arlington, Milburn, Orange Mts. (Bf), Gloucester (Li), Woodbury, XII, 13: the species occur rarely, in moist places under old leaves.
B. pulchellus Lec. Suffern, V (Bt), Arlington, salt meadows, Spring (Bf), Staten Island, V (Thompson), Orange, VI (Ch), Woodbury (W, Li).
B. maculatus Lec. Woodbury (W, Li).
B. micans Lec. Hopatcong (Pm), Newark, salt meadows (Bf), Orange (Ch), Westville (Li), Woodbury, VIII, 7 (W).
B. reflexus Lec. Orange, 1 example, VI (Ch).

CALATHUS Bon.

- C. gregarius* Say. Throughout the State, common, nearly all season.

C. opaculus Lec. "New Jersey" (Hw), g. d. (W), Atco (Li).

C. impunctatus Say. Ft. Lee (Sp), Sandy Hook, VII, 4 (Bt), Atco, sea shore (W), Atlantic City (Li).

PLATYNUS Bon.

P. angustatus Dej. Ft. Lee (Bt, Sp), Anglesea (W), Lahaway, V, 28, on cranberry bogs.

P. decens Say. Hopatcong (Pm), Ft. Lee, Palisades (Sp, Bt), Caldwell (Cr), Newark (Soc), Anglesea, VII (Sz).

P. sinuatus Dej. Ft. Lee, Palisades (Sp, Bt), Newark, Woodside, V, VI (Bf), Camden, Gloucester Co. (W), g. d., (Li), Lahaway, V, 28, on cranberry bogs.

P. opaculus Lec. Ft. Lee, rare (Sp).

P. tenuicollis Lec. Atlantic City (Castle), "New Jersey" (Bt).

P. cincticollis Say. Ft. Lee (Sp), Staten Island, IV (Bt), Orange, VI (Ch), Newark (Bf), Camden, Gloucester Co. (W), g. d. (Li).

P. reflexus Lec. Hopatcong (Pm), Ft. Lee (Sp, Bt), Palisades, VII, 27 (Lv), Staten Island, IV (Bt), g. d. (Li), Anglesea, VII, 25.

P. extensicollis Say. Throughout the State, V, VI, IX.

P. decorus Say. Throughout the State, not common; winters as an adult, taken Westville, I, 28 (W), in sifting.

P. pusillus Lec. Staten Island (Lg).

P. tenuis Lec. Hopatcong (Pm), salt meadows (Bf).

P. atratus Lec. Caldwell (Cr), Orange, V, at light (Ch), Snake Hill, IV (Bt), Westville, I, 28 (W).

P. melanarius Dej. Ft. Lee (Sp), Alpine, Snake Hill (Bt), Newark district (Bf), Camden, Gloucester Co. (W).

P. propinquus G. & H. "New Jersey," one specimen (W).

P. affinis Kirby. Palisades (Sp), Ft. Lee (Bt), Caldwell (Cr), Newark (Bf), Jamesburg, V, 10, Lahaway, V, 28.

P. metallescens Lec. Palisades (Sp), Hoboken, Snake Hill, V, (Bt), Newark, Orange Mts., salt meadows (Bf).

P. cupripennis Say. Throughout the State all season under stones, etc., in fields.

P. excavatus Dej. Palisades (Sp), Newark, Orange Mts. (Bf), Snake Hill (Sf), g. d. (Li), all rare; Westville, I, 28, common everywhere (W).

P. ferreus Hald. Same localities and reports as before.

P. basalis Lec. Hoboken, rare (Li).

P. nutans Say. Palisades (Sp), salt meadows (Bf).

P. octopunctatus Fabr. Throughout the State, IV, V, VI; winters as an adult and sifted out, I, 28, Westville (W).

P. placidus Say. Throughout the State, habits as before.

- P. bogemanni* Gyll. = *obsoletus* Say. Palisades (Sp), Snake Hill (Bt), Orange, VI (Ch), Newark, at light, salt meadows (Bf), seashore (Li), Anglesea (W).
- P. quadripunctatus* DeG. Newark, at light, one specimen (Bf).
- P. bembidioides* Kirby. Highlands, VI, one specimen (Ch).
- P. æruginosus* Dej. Throughout the northern half of State, under bark and at light, IV, V, VI, g. d. (W).
- P. crenistriatus* Lec. Hopatcong (Pm), Palisades (Sp), Newark, Woodside, V, 17 (Bf), Sandy Hook, VII, 4 (Bt), Brigantine beach, IX (Hu), Anglesea, VII, 23.
- P. rubripes* Zimm. Palisades (Sp), Ft. Lee (Bt), Brigantine beach, IX (Hu), sea shore (Li, W), Anglesea, V, 30.
- P. punctiformis* Say. Throughout the State, IV, V and IX, not at all common: on cranberry bogs, V, 28.
- P. sordens* Kirby. Palisades (Sp), Arlington, I, 31, IV, 17 (Bf), Orange, VI, one example (Ch), Woodbury, VIII, 7 (W).
- P. picicornis* Lec. Orange, VI, one specimen (Ch).
- P. ruficornis* Lec. Palisades, Ft. Lee (Sp, Bt), Westville, I, 28 (W), g. d. (Li, W).
- P. picipennis* Kirby. Hopatcong (Pm), Hoboken (Ll), IV, 24 (Bt).
- P. lutulentus* Lec. Palisades (Sp), Hoboken (Ll), Snake Hill, spring (Bt), Newark, salt meadows, Orange Mts. (Bf), Lahaway, V, 28, on cranberry bogs.

Mr. Schwarz suggests that some of the species of this genus are incorrectly determined in collections: if, as is probably the case, he is right, there may be some shifting of localities; but I doubt whether any species will drop out in the event.

OLISTHOPUS Dej.

- O. parmatum* Say. Orange Mts., Hackensack meadows, (Bf), Ft. Lee (Sf), Atlantic City (Li), g. d. (W); always rare.
- O. micans* Lec. Atlantic City (Li), Westville, under old leaves, sifting, I 28, VIII, 20 (W).

PERIGONA Lap.

- P. pallipennis* Lec. Arlington meadows, rare (Bf), Highlands, V (Sf).

ATRANUS Lec.

- A. pubescens* Dej. Palisades, VI (Sp), Ft. Lee, in running brooks (Ll), Orange Mts., IV, 19, out of rotten wood (Bf), Westville (Li), Camden, Gloucester (W).

LEPTOTRACHELUS Latr.

- L. dorsalis* Fabr. Hopatcong (Pm), Snake Hill, III, IV (Sf), in crevices of sand stone, between the layers (Bf), Orange, VI (Ch).

CASNONIA Latr.

C. pennsylvanica Linn. Throughout the State; winters as an adult; Westville, I, 28 (W).

C. ludoviciana Sallé. Camden, marsh along Delaware river, in sifting during winter.

GALERITA Fabr.

G. janus Fabr. Throughout the State, not rare.

G. bicolor Dru. G. d., more rare (Li, W).

TETRAGONODERUS Dej.

T. fasciatus Hald. Camden (Li), g. d. Westville, I and II, common in sifting (W).

LEBIA Latr.

L. grandis Hentz. Throughout the State: the species feeds on the eggs and young larvæ of the Colorado potato beetle, and seems to be increasing in numbers.

L. atriventris Say. Caldwell (Cr), Madison (Pr), Snake Hill (Bt), common everywhere (Bf), g. d. (W, Li), Anglesea.

L. tricolor Say. Salt meadows, II, 19, IV, 24 (Bf), Atlantic City, one specimen (Li).

L. pulchella Dej. Hopatcong (Pm), Madison, V, 30 (Pr), Snake Hill, IV (Sf), Orange, VII, not rare (Ch), Irvington, III, 17, and Newark district generally (Bf), Gloucester, Anglesea, Westville on golden rod, Atlantic Co. (W), seashore, rare (Li).

L. marginicollis Dej. DaCosta (Li).

L. viridis Say. Throughout the State on flowers, where most of the other species may also be found.

var *moesta* Lec. Atco, rare (Li).

L. pumila Dej. Madison, VIII, 6 (Pr), Orange Mts., g. d. (Bf), Greenville, Ridgewood, Passaic, VI and VII (Sp), g. d. (Li).

L. pleuritica Lec. Ft Lee (Sp), Snake Hill (Sf).

L. viridipennis Dej. Ft. Lee (Sp), Snake Hill (Sf), Orange, Spring Lake, VI (Ch), salt meadows (Bf), Brigantine beach, IX (Hn), g. d., not common (W).

L. lobulata Lec. Snake Hill, one specimen (Sf).

L. ornata Say. Throughout the State, every month from March to September, locally common.

L. analis Dej. Ft. Lee (Sp), Snake Hill (Sf), Orange, VI, at light (Ch), Westville (Li), g. d. (W).

L. fuscata Dej. Greenville, Ridgewood, Passaic, VI, VII (Sp), Snake Hill, V (Sf, Bf), g. d. (Li).

L. scapularis Dej. Madison, VIII, 18 (Pr), Orange Mts. (Bf), Orange, VI, light (Ch), Ft. Lee (Sp), g. d. (W, Li), New Brunswick,



Fig. 81.—*Lebia grandis*.

L. furcata Lec. Hopatcong (Pm), Snake Hill, IV (Bf).

L. vittata Fabr. Madison (Pr), Orange Mts., rare in sweeping, Newark (Bf), Snake Hill (Sf), g. d., rare (Li). Burlington Co., VI, 9. Mr. Schwarz thinks the species referred to in these records is really *pectita* Horn.

var. *spraguei* Horn. New Jersey (Castle).

L. bivittata Fabr. Seashore, rare (Li).

COPTODERA Dej.

C. ærata Dej. Seashore (Li), Anglesea, VII (W).

DROMIUS Bon.

D. piceus Dej. Hoboken (Sp), Newark district (Bf), Camden, Gloucester Co. (W), g. d. (Li), Anglesea, VI, usually under bark, sometimes (Bt) on golden-rod.

APRISTUS Chd.

A. cordicollis Lec. Gloucester (Li), Clementon (Lt), Anglesea; on sand banks along streams, like *Bembidiids*.

A. subsulcatus Dej. Snake Hill (Sf), Woodside, early in spring (Bf).

BLECHRUS Mots.

B. nigrinus Mann. Hoboken (Sp), Ft. Lee (Bt), under bark: also reported among roots of grasses in dry meadows

METABLETUS Schm.—Goeb.

M. americanus Dej. Salt meadows, locally common (Bf), "New Jersey" (W), New Brunswick and probably throughout the State.

AXINOPALPUS Lec.

A. biplagiatus Dej. Hoboken (Sp), Ft. Lee (Bt), Anglesea (Bf, W), under bark.

CALLIDA Dej.

C. decora Fabr. Newark, VII, 7, one specimen (Bf).

C. punctata Lec. Greenwood Lake, VI, 21 (Lv), Caldwell (Cr).

C. purpurea Say. Greenwood Lake (Beyer), Hopatcong (Pm), DaCosta (Li), Atlantic City, in wash-up (W).

PLOCHIONUS Dej.

P. timidus Hald. Hoboken (Sp), Westville (Li), g. d. (W); generally under bark.

PINACODERA Schaum.

- P. limbata* Dej. Palisades and Ft. Lee, south to Cape May along the coast, Camden and Gloucester Counties, V, VI, VII and IX.
- P. platicollis* Say. Hopatcong (Pm), Madison (Pr), Newark district (Bf), Westville (Li), Camden, Gloucester Co., sea-shore (W).

CYMINDIS Latr.

- C. elegans* Lec. Atco, 2 specimens (Li).
- C. americana* Dej. Hopatcong, Weehawken (Bt), Newark district (Bf), sea-shore (Li), g. d. (W) : under stones in dry localities, nowhere common.
- C. pilosa* Say. Weehawken, VI, VII (Bt), Newark district, under dry cow-dung, locally common in late fall (Bf), Caldwell (Cr), Camden, Gloucester Co. (W), g. d. (Li).
- C. neglecta* Hald. Hopatcong (Pm), Newark district (Bf), Camden, Gloucester Co. (W).

APENES Lec.

- A. lucidula* Dej. Hopatcong, VI (Pm, Bt), Newark, light (Bf), Highlands (Ch), Atlantic Co. (W), seashore (Li), Sandy Hook to Cape May, along shore.
- A. sinuata* Say. Madison, IV, 29 (Pr), Snake Hill (Sf), Newark, Orange Mts., salt meadows, III, 16 (Bf), Atlantic Co. (Li), Anglesea (W), Sandy Hook to Cape May, along shore ; not common.

HELLUOMORPHA Lap.

- H. nigripennis* Dej. Atco (Li), DaCosta, VII, 3, Cape May Court House, V, 25 (W), very rare.
- H. bicolor* Harr. Ft. Lee, V, under stones (Bt), Orange Mts., one pair (Bf), Camden Co. (W), rare,
- H. texana* Lec. Long Branch, one specimen in wash-up (Buckman).
- H. ferruginea* Lec. Greenville, under logs, rare (Sp).

BRACHYNUS Web.

- B. janthinipennis* Dej. Orange Mts. in rotten stump (Bf), Vineland (U S Ag).
- B. viridipennis* Dej. "New Jersey" (Sp), Newark (Bf).
- B. minutus* Harr. Along the Palisades (Sp).
- B. perplexus* Dej. Along the Palisades (Sp).
- B. medius* Harr. Along the Palisades (Sp).
- B. quadripennis* Dej. Along the Palisades (Sp).
- B. conformis* Dej. Along the Palisades (Sp).
- B. cyanipennis* Say. Palisades (Sp), Snake Hill, V, 22 (Bf).

- B. alternans* Dej. Along the Palisades (Sp).
B. tormentarius Lec. Salt Meadows (Bf), Snake Hill.
B. fumans Fabr. Reported by all collectors from all sections, and usually as common.
B. similis Lec. Newark (Bf), Brigantine beach, IX (Hn).
B. cordicollis Dej. Palisades (Sp), Caldwell (Cr), Orange Mts. (Bf), g. d. (Li).

This genus has not yet been revised and the names stand as such, mostly based upon superficial comparison with the specimens in the Horn collection. The Schaupp records are as reliable as any can be under the present condition of affairs.

CHLÆNIUS Bon.

- C. erythropus* Germ. Snake Hill, 1 specimen (Bf), Atlantic Co., Anglesea in wash-up (W).
C. sericeus Fœrst. Hopatcong (Pm), Madison (Pr), Newark district (Bf), Caldwell (Cr), Palisades, Snake Hill, Ridgewood (Sp), Ft. Lee, IV, 26 (Lv), g. d. (W, Li), New Brunswick, VII.
C. laticollis Say. Throughout the State: common in Spring in the Ft. Lee, Snake Hill and Newark districts, more rare southwardly.
C. diffinis Chd. Palisades in spring (Sp).
C. æstivus Say. Throughout the State, spring and fall; more common northwardly.
C. angustus Newn. Anglesea, one specimen in wash-up (W).
C. leucoscels Chev. Greenwood Lake, locally not rare (Bt).
C. nemoralis Say. Throughout the State, rather commonly: like most of the species under stones and other shelter.
C. tricolor Dej. Throughout the State, rather common.
C. pennsylvanicus Say. Throughout the State, more common in the northern districts in spring.
C. impunctifrons Say. Ft. Lee, VI (Bt), Caldwell (Cr), g. d. (W, Li), Palisades in spring.
C. niger Rand. Hopatcong (Pm), Palisades (Sp), Hoboken (Bt), Snake Hill, IV, 26 (Lv), Orange, VI (Ch), along salt meadows in spring (Bf), Anglesea and along Delaware under drift (W).
C. purpuricollis Rand. "New Jersey" (Horn); but Mr. Schwarz suggests an error in locality and says the species is boreal.
C. tomentosus Say. Madison (Pr), Newark district under dry cow-dung (Bf), seashore (Li), g. d. (W), New Brunswick, VIII, and occurs throughout the State in my experience.

ANOMOGLOSSUS Chd.

- A. emarginatus* Say. Throughout the State, locally common, V, VI, VII.

A. pusillus Say. Also g. d., spring and fall; but more rare than the preceding.

BRACHYLOBUS Chd.

B. lithophilus Say. Hopatcong, VI (Bt), Palisades, III (Sp), Snake Hill (Sf), Gloucester (Li), Anglesea, Westville, under drift and in meadows (W).

LACHNOCREPIS Lec.

L. parallelus Say. Hopatcong (Pm), Snake Hill, IV, 26 (Lv), salt meadows (Bf), Gloucester, Westville (Li), under drift in spring on meadows (W); locally not rare.

OÖDES Bon.

O. amaroides Dej. Palisades (Sp), Snake Hill (Sf), Atco (Li), Westville, Woodbury, VI, 8 (W).

O. americanus Dej. Hopatcong (Pm), Palisades (Sp), Hoboken, IV, 24 (Bt), Snake Hill (Sf), Westville (Li).

O. fluvialis Lec. Salt meadows (Bf), Westville (Li), Camden, Gloucester, under drift on meadows, V, (W).

O. lecontei Chd. Camden, Gloucester Co., Anglesea (W).

GEOPINUS Lec.

G. incrassatus Dej. Newark at light (Bf), Dunellen, X (Sm), Greenville in sandy soil (Sp), Lakewood (Lv), Westville (Li), g. d., in sandy districts along water (W).

CRATACANTHUS Dej.

C. dubius Beauv. Woodside, Newark (Bf), g. d. (Li), in sandy districts along water-courses (W), New Brunswick.

AGONODERUS Dej.

A. lineola Fabr. Throughout the State, often at light, IV-VII, IX.

A. infuscatus Dej. Anglesea (Li), Brigantine, IX (Hn), g. d. (W).

A. pallipes Fabr. Throughout the State, common at light in spring and early summer, and again in fall.

A. partarius Say. Palisades in spring (Sp), salt meadows (Bf), Westville, I, 28; Anglesea (W), g. d. (Li); usually not rare.

A. pauperculus Lec. Salt meadows (Bf), Lahaway, V, 28, on cranberry bogs.

A. indistinctus Say. Along Palisades, rare (Sp).

A. testaceus Dej. Lakewood, V (Bt), Atlantic City (Castle), Anglesea (W).

DISCODERUS Lec.

- D. parallelus* Hald. Salt meadows (Bf), Atlantic City (Li), Anglesea, sea-shore generally (W).

GYNANDROPUS Dej.

- G. hylacis* Say. Hopatcong (Pm), Clifton (Ch), Caldwell (Cr), Hoboken, under bark (Sp), Atlantic City (Li), g. d. (W), Anglesea, VI, 20.

HARPALUS Latr.

- H. dichrous* Dej. Caldwell (Cr), Snake Hill (Sf), Westville (Li), g. d. (W); never very common.
- H. vulpeculus* Say. Hopatcong (Pm), Snake Hill (Sf), Newark district (Bf), g. d. (W, Li); not rare.
- H. autumnalis* Say. Seashore (Li), g. d. under leaves (W).
- H. erraticus* Say. Throughout the State, VII, VIII; locally not rare.
- H. viridiæneus* Beauv. Throughout the State, most abundant near cities, under stones in vacant lots or meadows.
- H. caliginosus* Fabr. Throughout the State; sometimes very abundant in fall on seeds of *Ambrosia artemisiifolia* (Ch).
- H. faunus* Say. G. d., not rare (Sp, W, Li).
- H. convivus* Lec. New Brunswick, one specimen.
- H. vagans* Lec. Hopatcong (Pm), g. d., not rare (Sp, W, Li), Anglesea, V, 27, New Brunswick, VII.
- H. pennsylvanicus* De G. Common everywhere, all summer, readily attracted to light and sometimes a nuisance.
- var *compar* Lec. With the type, but less common.
- var *erythropus* Dej. Hopatcong (Pm), Newark (Bf), Palisades (Sp).
- H. spadiceus* Dej. Madison (Pr), Palisades (Sp).
- H. fallax* Lec. Highlands, Orange, VI, (Ch), "New Jersey" (Hw).
- H. pleuriticus* Kirby. Along the Palisades (Sp).
- H. herbivagus* Say. Throughout the State in spring, early summer and fall, locally common.
- H. nitidulus* Chd. Seashore (Li), Clifton, Highlands (Ch), rare.
- H. viduus* Lec. Lake Hopatcong (Pm).



Fig. 82.—*Harpalus caliginosus*.

SELENOPHORUS Dej.

- S. pedicularius* Dej. Ocean Beach (Pr), Atlantic City (Castle), Brigantine beach, IX (Hu), Anglesea, VII (Bf), seashore (Li), Westville, III 5 (W).

S. iripennis Say. Staten Island (Lg), Anglesea (W).

S. gagatinus Dej. Snake Hill (Bf).

S. opalinus Lec. Orange (Ch), Snake Hill, IV, 26 (Lv), Newark (Bf), Ocean Beach (Pr), under leaves in Spring (W), sea-shore (Li), New Brunswick, VII, not rare.

S. ovalis Dej. Brigantine beach, IX (Hn).

S. ellipticus Dej. Orange Mts., IV, and thence reported southward from all shore points, V, VI and IX.

STENOLOPHUS Dej.

S. carbonarius Brullé. Ocean Beach (Pr), Atlantic City, Anglesea (Li), Brigantine beach, IX (Hn).

S. spretus Dej. Anglesea (W, Li).

S. fuliginosus Dej. Hopatcong (Pm), Clifton (Ch), Newark, salt meadows, V, 22 (Bf), g. d. (W, Li).

S. plebeius Dej. Irvington, salt meadows (Bf), Ocean Beach (Pr), Brigantine beach, IX (Hn), Westville, I, 28, sifting (W), Lahaway, V, 28, on cranberry bogs.

S. conjunctus Say. Throughout the State, not rare, spring and fall; at Westville, I, 28, sifting (W).

S. anceps Lec. Weehawken, IV, 2 (Bt).

S. humidus Hamilton. Madison (Pr): this is the species referred to as new, in the first edition.

S. ochropezus Say. Throughout the State, spring and fall; hibernates as an adult.

S. dissimilis Dej. Atlantic City, Anglesea, one specimen at each, in beach-wash (W).

ACUPALPUS Latr.

A. hydropicus Lec. Hopatcong (Pm), Newark, salt meadows, III, 5 (Bf), Lahaway, V, 28, on cranberry bogs.

A. carus Lec. Hopatcong (Pm), salt meadows, I, 31, II, 21 (Bf), Westville, I, 28, g. d. (W).

BRADYCELLUS Er.

B. linearis Lec. Orange, VI, one example (Ch).

B. rupestris Say. Hoboken, IV, 24 (Bt), salt meadows, II, 12 (Bf), Lahaway, on cranberry bogs, V, 28 (Sm), Brigantine, IX (Hn).

B. tantillus Chd. Hopatcong (Pm), Orange, VI, one example (Ch), So. Camden, Anglesea (W).

TACHYCELLUS Moraw.

T. kirbyi Horn. Fort Lee (Sf).

T. atrimediis Say. Staten Island (Lg).

T. badiipennis Hald. Woodside, rare (Bf), Snake Hill (Sf), Westville, I, 28, and II, sifting (W).

ANISODACTYLUS Dej.

- A. dulcicollis* Laf. Brigantine beach, IX (Hn), Lahaway, IX, 6.
A. rusticus Say. Throughout the State, spring and fall.
A. carbonarius Say. Atlantic City (Li), g. d. (W), Anglesea, V.
A. interpunctatus Kirby. "New Jersey," VII (Bt), g. d. (W), Newark.
A. harrisii Lec. Ft. Lee, IV, V (Bt), seashore (Li), Newark.
A. agricola Say. Hopatcong (Pm), g. d. (W), New Brunswick.
A. melanopus Hald. G. d. (Li).
A. nigerrimus Dej. Hopatcong (Pm), Ft. Lee, IV, 11 (Bt), Brigantine beach, IX (Hn).
A. nigrita Dej. Hopatcong (Pm), Ft. Lee, IV, 11 (Bt).
A. discoideus Dej. Hopatcong (Pm), Orange, VI (Ch), Orange Mts., Spring, on swampy ground (Bt), Gloucester (W), sea-shore (W, Li).
A. baltimorensis Say. Throughout the State, more or less common at all seasons.
A. verticalis Lec. Anglesea, VIII (Sm).
A. piceus Men. Newark, light (Bf), Brigantine beach, IX (Hn), Anglesea (W).
A. terminatus Say. Throughout the State, Spring and fall.
A. nitidipennis Lec. Snake Hill, Ft. Lee, 2 specimens (Sf), Newark, salt meadows, V, 24 (Bf).
A. lætus Dej. Anglesea, VI, 26, Woodbury, VII, 20 (W), Anglesea, VII, 4 (Li), Brigantine beach, IX (Hn).
A. cœnus Say. Atlantic City, rare (Li), Newark, rare (Bf), Woodbury, VII, 30 (W).
A. lugubris Dej. Newark (Soc), Gloucester (Li), g. d. (W), Lahaway, V, 28, on cranberry bogs.
A. sericeus Harr. Hopatcong (Pm), Ft. Lee (Bt), Orange Mts., VI, common at light (Ch), Gloucester (Li), g. d. (W), New Brunswick, V.
A. interstitialis Say. Hopatcong (Pm), Ft. Lee, Snake Hill (Bt), Madison (Pr), Orange (Ch), g. d. (W, Li), New Brunswick.

Family HALIPLIDÆ.

Small, oval, water beetles pointed at each end, the greatest breadth at or a little behind the shoulders of the wing covers. Live in ponds, streams and ditches in the adult as well as larval stages, and are of no economic importance.

HALIPLUS Latr.

- H. fasciatus* Aubé. Madison, V, 19 (Pr), Ft. Lee district, VI (Bt), Orange, VI, Spring Lake (Ch), Camden (Li), Camden, Gloucester County (W).
H. punctatus Aubé. "New Jersey" (U S N M).
H. triopsis Say. Orange Mts. (Bf), "New Jersey" (Roberts).
H. ruficollis DeG. Ft. Lee district, VI (Bt), g. d. (Li, W): all the species live in stagnant pools.

CNEMIDOTUS Er.

- C. 12-punctatus* Er. Occurs throughout the State in pools of stagnant water, spring and fall.
C. edentulus Lec. Spotswood (Bt), "New Jersey" (Roberts).

Family DYTISCIDÆ.

"Water tigers," or "predaceous diving beetles." Oval and somewhat flattened, with rather short, stout swimming legs, the anterior much the shortest, antennæ slender and filiform. The larvæ are also aquatic and predatory and to them the term "water tigers" is more particularly applied. They are interesting in structure and habits, but of no importance economically.

CANTHYDRUS Sharp.

- C. bicolor* Say. Anglesea (IV).

HYDROCANTHUS Say.

- H. iricolor* Say. Ft. Lee district (Bt), Newark (Soc), g. d. (Li), "New Jersey" (U S N M).

LACCOPHILUS Leach.

- L. maculosus* Germ. Madison, V, 8 (Pr), Greenwood Lake, Ft. Lee district (Bt), Caldwell (Cr), Newark (Soc), Spring Lake (Ch), g. d. (Li), Staten Island: all the species occur in pools and flowing water.
L. proximus Say. Ft. Lee district (Bt), "New Jersey" (Roberts, U S N M).
L. fasciatus Aubé. Throughout the State in spring.
L. undatus Aubé. Madison, V, 10 (Pr), Ft. Lee district (Bt), "New Jersey" (Roberts, U S N M).

HYDROVATUS Mots.

- H. cuspidatus* Germ. Ft. Lee district Staten Island (Bt), Camden (Li); in pools of stagnant water.
H. pustulatus Mels. Staten Island (Bt), "New Jersey" (U S N M).

DESMOPACHRIA Bab.

- D. convexa* Aubé. Madison, VII, 28 (Pr), Orange, VI, 5, not rare at light (Ch), Camden (Li); occurs in pools of stagnant water.

BIDESSUS Sharp.

- B. affinis* Say. Madison, IV, 28 (Pr), Orange (Ch), Newark, Woodside (Bf), g. d. (Li); not rare anywhere.
B. granarius Aubé. Madison (Pr), "New Jersey" (U S N M).

CELINA Aubé.

- C. angustata* Aubé. Staten Island (Lg), Newark (Bf), Anglesea, VI, 15 (Boerner).
C. grossula Lec. Anglesea, VI, 26 (Boerner), VII (Li).

CÆLAMBUS Thom.

- C. inæqualis* Fabr. "New Jersey" (U S N M).
C. punctatus Say. Spotswood (Bt), Newark (Bf), Orange (Ch), g. d. (Li); not rare, anywhere.
C. turbidus Lec. Staten Island (Lg).
C. nubilus Lec. Ft. Lee district (Bt), Bloomfield (Bf), g. d. (Li).
C. dissimilis Harr. Woodside (Bf), Camden, VII, 20 (Boerner).
C. impressopunctatus Sch. Hoboken, IV, 24 (Bt), sea-shore (Li), Anglesea, VI, 4 (W).

DERONECTA Sharp.

- D. catascopium* Say. "New Jersey" (U S N M).

HYDROPORUS Clairv.

- H. concinnus* Lec. "New Jersey" (Roberts): the species occur in brooks and springs.
H. pulcher Lec. Newark (Bf), Westville, VII, 15 (W).
H. integer Sharp. "New Jersey" (Roberts).
H. undulatus Say. Madison (Pr), Spring Lake (Ch), Orange Mts. (Bf), Snake Hill (Bt), Newark (Soc), Westville, VII, 9, Merchantville, IV, 24, Atco, V, 29, Da Costa, VII, 30, Anglesea, V (Boerner), Lahaway, V, 28.

- H. consimilis* Lec. "New Jersey" (U S N M).
H. striatopunctatus Mels. Staten Island (Lg).
H. solitarius Sharp. Madison (Pr), Newark, Woodside (Bf).
H. alpinus Payk. Staten Island (Lg).
H. obscurus Sturm. G. d., not rare (Li).
H. tenebrosus Lec. "New Jersey" (U S N M).
H. signatus Mann. Orange Mts. (Bf), Staten Island (Lg).
H. americanus Aubé. "New Jersey" (U S N M).
H. dichrous Mels. "New Jersey" (U S N M).
H. niger Say. Newark (Bf), Lahaway, V, 28.
H. modestus Aubé. Madison (Pr), Ft. Lee district (Bt), Newark, Woodside (Bf), "New Jersey" (U S N M).
H. stagnalis G. & H. "New Jersey" (U S N M).
H. oblitus Aubé. Staten Island (Lg).
H. difformis Lec. Staten Island, VI, in woodland pools (Lg).

ILYBIUS Er.

- I. ater* De G. Orange, VI (Ch).
I. 4-maculatus Lec. Lake Hopatcong (Pm).
I. biguttulus Gem. Lake Hopatcong (Pm), Ft. Lee district (Bt), Orange, VI (Ch), Orange Mts. (Bf), Westville, I, 28 (W).

COPTOTOMUS Say.

- C. interrogatus* Fabr. Throughout the State, not uncommon.

ILYBIOSOMA Cr.

- I. bifarius* Kirby. Woodside, common (Bf).

COPELATUS Er.

- C. glyphicus* Say. Ft. Lee district (Bt), Newark, salt meadows (Bf), Orange (Ch), Westville, I, 28 (W), Brigantine beach, IX (Hn), g. d., not rare (Li), Anglesea.

MATUS Aubé.

- M. bicarinatus* Say. Ft. Lee, VIII, (Bt), "New Jersey" (U S N M).

AGABETES Cr.

- A. acuductus* Harr. Woodside (Bf), Staten Island, VI, in woodland pools (Lg), Woodbury, VII, 7 (Bœrner).

AGABUS Leach.

- A. seriatus* Say. "New Jersey" (Roberts, U S N M); occurs in springs and creeks as do all the species of this genus.
- A. obtusatus* Say. Woodside (Bf), "New Jersey" (Roberts).
- A. punctatus* Mels. Fort Lee district, VI (Bt), "New Jersey" (U S N M).
- A. semipunctatus* Kirby. Newark (Dkn), "New Jersey" (Bf).
- A. tæniolatus* Harr. "New Jersey," exact locality unknown (Li).
- A. disintegratus* Cr. Ft. Lee district, V, VI (Bt), Newark (Soc), Long Branch (Ch), g. d. (Li); not rare and probably occurs throughout the State.
- A. reticulatus* Kirby. Woodbury, VI, 8, Anglesea, VI, 15 (Børner).
- A. erythropterus* Say. "New Jersey" (Roberts, U S N M).
- A. gagatus* Aubé. Fort Lee, VII (Bt), Newark (Soc).
- A. discors* Lec. Newark (Dkn).

RHANTUS Esch.

- R. flavogriseus* Cr. Staten Island (Lg).
- R. binotatus* Harr. Newark (Soc).
- R. calidus* Fabr. "New Jersey" V, VI (Bt), Camden, Gloucester County (W).
- R. sinuatus* Lec. "New Jersey" (Bf).

COLYMBETES Clairv.

- C. sculptilis* Harr. Madison (Pr), Caldwell (Cr), Orange (Ch), Ft. Lee district (Bt), Snake Hill (Sf), Newark (Soc), Orange (Ch).

HYDATIUS Leach.

- H. stagnalis* Fabr. Staten Island (Lg), Ft. Lee district (Bt).
- H. piceus* Lec. Caldwell (Cr).
- H. bimarginatus* Say. Woodside (Bf), Anglesea (Li).

DYTISCUS Linn.

- D. harrisii* Kirby. Caldwell (Cr).
- D. fasciventris* Say. Hopatcong (Pm), Caldwell (Cr), Madison (Pr), Camden, Gloucester, Atlantic County (W).
- D. hybridus* Aubé. "New Jersey" (Roberts, U S N M).
- D. verticalis* Say. "New Jersey" (Roberts, U S N M).

ACILIUS Leach.

- A. semisulcatus* Aubé. Madison (Pr), Caldwell (Cr), Ft. Lee in quarry holes, VII, 26 (Bt), Newark.
- A. fraternus* Harr. Madison (Pr), Staten Island (Lg), Anglesea (Li).
- A. mediatu*s Say. Hopatcong (Pm), Ft. Lee (Ll), in quarry holes (Bt), Camden, Gloucester, Atlantic County (W), seashore (Li).

THERMONECTES Esch.

- T. basilaris* Harr. Ft. Lee district (Bt), g. d. (Li).
var *intermedius* Cr. Newark (Bf).

GRAPHODERUS Esch.

- G. liberus* Say. Madison (Pr), Newark (Soc), New Jersey (Roberts, U S N M).
- G. fasciaticollis* Harr. Fort Lee (Bt), "New Jersey" (U S N M), Newark.

CYBISTER Curt.

- C. fimbriolatus* Say. Caldwell (Cr), New Jersey (Roberts, U S N M), Newark, Anglesea.

Family GYRINIDÆ.

"*Whirligig beetles*," so named from their habit of swimming about in groups or swarms on the surface of ponds or quiet streams and ditches, the individuals whirling round and round without apparent aim. They are black or a little bronzed, convex above, flattened below, with short, paddle-like swimming legs, the anterior pair long and arm-like. They as well as their larvæ are predatory, and of no economic importance.

GYRINUS Linn.

- G. rockinghamensis* Lec. Hopatcong (Pm), Atco (Li), Atlantic Co. (W), Ocean Co., everywhere common.
- G. limbatus* Say. Atco, Egg harbor (Li).
- G. dichrous* Lec. Lake Hopatcong (Pm), "New Jersey" (U S N M).
- G. ventralis* Kirby. Orange (Ch), g. d. (Li), "New Jersey" (U S N M).
- G. affinis* Aubé. "New Jersey" (U S N M).
- G. analis* Say. Spring Lake (Ch), Atlantic Co. (W), Lahaway, V, 28.
- G. borealis* Aubé. Madison (Pr), Atlantic Co. (W), Lahaway, V, 28, Jamesburg.
- G. lugens* Lec. Atco (Li).

DINEUTES MacL.

- D. vittatus* Germ. New Brunswick and southward everywhere, in ditches and small streams ; never in ponds.
- D. emarginatus* Say. Middle States generally, and certain to be found in New Jersey.
- D. hornii* Roberts. Westville (Reinecke), probably throughout the State.
- D. nigrior* Roberts. New Brunswick, and probably elsewhere in the State.
- D. assimilis* Aubé. Common throughout the State.
- D. discolor* Aubé. Common throughout the State.

Family HYDROPHILIDÆ.

The "water scavengers"; usually black in color, sometimes with yellow, orange or red markings along the margins, usually smooth, polished and very convex above, flattened below. The antennæ are short and clavate, or clubbed at the tip ; hence they are easily distinguished, even by a novice, from the water divers. A number of the smaller species have a little different shape and have the surface rough and pitted, crawling, rather than swimming, on the soil and vegetation underneath the surface. Some other small species live in moist earth or in dung or other fermenting and decaying vegetation. They are of no economic importance.

HELOPHORUS Fabr.

- H. lacustris* Lec. Madison, VII, 1 (Pr), Staten Island, Ft. Lee (Bt), Hoboken (Ll), Orange, VI (Ch), Palisades : always common.
- H. lineatus* Say. Madison (Pr), Woodside, salt meadows (Bf), Ft. Lee, V (Bt), Newark (Soc), g. d. (Li).
- H. tuberculatus* Gyll. Westville (Li).

HYDROCHUS Leach.

- H. scabratus* Muls. Ft. Lee, V (Bt), Newark (Soc), Long Branch (Ch), Westville, I, 28, sifting (W), g. d., common (Li).
- H. inæqualis* Lec. Staten Island, V (Bt), "New Jersey" (U S N M).
- H. subcupreus* Rand. "New Jersey" (Roberts, U S N M).
- H. variolatus* Lec. Camden, not rare (Li).
- H. squamifer* Lec. Lake Hopatcong (Pm), Merchantville, III, 10, DaCosta, Anglesea, VII, 30 (Boerner).

OCHTHEBIUS Leach.

- O. benefossus* Lec. "New Jersey" (Horn) ; but Mr. Schwarz thinks the locality incorrect.

HYDRÆNA Kug.

- H. pennsylvanica* Kies. Ft. Lee (Sf), Woodside (Bf), "New Jersey" (Roberts, U S N M).

HYDROPHILUS Geoffr.

- H. ovatus* G. & H. Newark (Soc), Westville (Li), New Brunswick, Lakewood; always rare.
- H. triangularis* Say. Throughout the State, usually common; often attracted to electric lights.
- H. limbalis* Lec. Spring Lake, Allaire (Ch), Staten Island (Lg).
- H. nimbatus* Say. Madison (Pr), Newark (Soc), g. d. (Li), New Brunswick, Ocean Co.
- H. mixtus* Lec. Madison (Pr), g. d. (Li).
- H. glaber* Hbst. Caldwell (Cr), Brigantine beach, IX (Hn), "New Jersey" (Roberts, U S N M), along the Palisades, common.

HYDROCHARIS Latr.

- H. obtusatus* Say. Reported from all parts, by all collectors, usually IV and V.

BEROSUS Leach.

- B. pantherinus* Lec. Lake Hopatcong (Pm), Spring Lake and probably common along the coast (Ch).
- B. peregrinus* Hbst. Greenwood Lake, VI (Bt), Newark (Bf), g. d. (Li).
- B. exiguus* Say. Woodbury, IX, 10 (Kp).
- B. iufuscatus* Lec. Woodbury, IX, 10 (Kp).
- B. striatus* Say. Madison, VII, 19 (Pr), Caldwell (Cr), Camden, Gloucester Co. (W), g. d. (Li).

LACCOBIUS Er.

- L. agilis* Rand. Snake Hill (Sf), Westville (Li), "New Jersey" (Roberts, U S N M).

PHILHYDRUS Sol.

- P. nebulosus* Say, Hoboken, salt meadows, Snake Hill (Bt), Orange, VI (Ch), Newark (Bf).
- P. bifidus* Lec. Ft. Lee, IV, 18, under stones (Bt), "New Jersey" (U S N M).
- P. ochraceus* Mels. Orange, VI (Ch), Westville, I, 28, Camden, Gloucester Co. (W), Brigantine beach, IX, common in fresh water pools (Hn).
- P. reflexipennis* Zimm. Brigantine, IX, common in fresh pools (Hn), Anglesea, IX, 5 (Lv).
- P. cinctus* Say, Ft. Lee (Bt), Newark (Soc), g. d. (Li), "New Jersey" (Roberts, U S N M), Orange (Ch).

- P. diffusus* Say. Snake Hill, Hoboken, IV, 24, salt meadows (Bt).
P. perplexus Lec. Throughout the State, IV to VI.
P. hamiltoni Horn. Newark (Bf), Brigantine beach, IX (Hn), Anglesea (W).

HYDROCOMBUS Sharp.

- H. fimbriatus* Mels. Madison (Pr), Ft. Lee, in quarries with water (Bt), Newark (Bf), Clifton, Spring Lake (Ch), Westville, I, 28, Camden, Gloucester Co. (W).
H. lacustris Lec. Hoboken (Li), Woodside, Newark (Bf), sea-shore (Li).
H. rotundatus Say. Caldwell (Cr), Newark (Bf); but there may be some doubt of the determination.

HYDROBIUS Leach.

- H. tumidus* Lec. Camden, III, 3 (Bœrner).
H. globosus Say. Lake Hopatcong (Pm), Palisades, VII, 19 (Lv), Englewood in fresh water streams under stones, IV (Bt), Caldwell (Cr), Newark (Soc), Westville (Li).
H. fuscipes Linn. Orange (Ch), VII (Bt), Camden, Gloucester (W).
H. subcupreus Say. (*Creniphilus*.) Lake Hopatcong (Pm), Ft. Lee (Bt), Orange, VI (Ch), Brigantine beach, IX (Hn), g. d. (Li), Anglesea, common (W).
H. suturalis Lec. Brigantine beach, IX (Hn).

CERCYON Leach.

- C. naviculare* Zimm. Newark (Bf).
C. melanocephalum Linn. Newark (Bf).
C. granarius Er. Anglesea, during winter, sifting (W).
C. centromaculatum Sturm. Orange Mts.: this and most of the species occur in decaying vegetable material.
C. littoralis Gyll. Sea-shore (Li), Newark (Bf); an imported species.
C. prætextatum Say. Orange, VI (Ch), Hoboken, IV, 24 (Bt), Brigantine beach, IX (Hn), g. d. (Li).
C. ocellatum Say. Ft. Lee (Bt), g. d. (Li).
C. pygmæum Ill. Lake Hopatcong (Pm), Madison (Pr), Ft. Lee, VIII, 8 (Bt).
C. unipunctatum Linn. Hopatcong (Pm), Orange, in horse dung (Ch), g. d. (Li).
C. anale Payk. Madison (Pr), Camden (Li), Orange Mts., Ocean County on cranberry bogs, V, 28.
C. depressus Steph. Highlands (Ch).
C. hæmorrhoidalis Fab. G. d., common (Li).
C. lugubris Payk. Camden (Li).

PHÆNONOTUM Sharp.

P. extricatum Say. Brigantine beach, IX (Hn), Camden (Li), III, 3-15, sifting along river front (W).

CRYPTOPLEURUM Muls.

C. minutum Fab. Arlington, Newark, V (Bf), Camden (Li), DaCosta, V, 21 (Boerner).

Family SILPHIDÆ.

"Carriion beetles," and "burying beetles"; varying much in shape, but little in habit; dead animal matter being the favorite food, though other decaying materials such as fungi are sometimes taken. The antennæ are capitate, or terminated by a short, spherical club, which is very sensitive to the presence of decay. They are of no direct benefit to the agriculturist, but very useful indirectly by removing and changing the form of animal remains. Small animals are buried completely, the larvæ living in them as they slowly decay beneath the surface.

NECROPHORUS Fabr.

N. americana Oliv. Throughout the State though not common: the species of this genus are the burying beetles.

N. sayi Lap. Hudson Co. (Ll), Ft. Lee (Bt).

N. orbicollis Say. Madison (Pr), Caldwell (Cr), Ft. Lee, VI (Bt), Hudson Co. (Ll), Newark (Soc), Westville (Li), g. d. (W).

N. marginatus Fabr. Throughout the State, and one of the most common species on carrion of all kinds.

N. guttula Mots. Hudson Co. (Ll).

N. tomentosus Weber. Hopatcong (Pm), Caldwell (Cr), Ft. Lee (Bt), Newark (Soc), Hudson Co. (Ll), New Brunswick.

N. vespilloides Hbst. Caldwell (Cr), Snake Hill (Sf).

SILPHA Linn.

S. surinamensis Fabr. Throughout the State under carrion and much the largest of the flat forms; easily known by the greatly enlarged hind legs.

S. lapponica Hbst. River Edge (U S Ag), Newark (Soc), New Brunswick; most common on snakes, toads and other reptilia.

S. inæqualis Fabr. Throughout the State, not rare.

S. noveboracensis Forst. Also occurs throughout the State.

S. americana Linn. Occurs on toad-stools and in dung, as well as on carrion everywhere, though not usually common.

CHOLEVA Latr.

- C. simplex* Say. Newark (Bf).
C. basillaris Say. Hudson Co. (Ll).
C. clavicornis Lec. Hopatcong (Pm), Newark (Bf).
C. terminans Lec. Anglesea, in July (Sz).

PRIONOCHÆTA Horn.

- P. opaca* Say. Snake Hill (Sf), Hudson Co. (Ll), Anglesea, VII (Sz).

CATOPOMORPHUS Kraatz.

- C. parasitus* Lec. Hudson Co. (Ll), Newark, in ant's nests (Bf); occurs in nests of *Formica integra*.

COLON Hbst.

- C. dentatum* Lec. Snake Hill, sweeping at dusk (Sf).

LIODES Latr.

- L. discolor* Mels. Hudson Co. (Ll), Atlantic Highlands (Sz).
L. basalis Lec. Spring Lake, in gilled fungi (Ch), Gloucester, VII, sifting bark from a pine log (W).

AGATHIDIUM Ill.

- A. oniscoides* Beauv. Snake Hill, abundant on fallen trees (Ll); occurs generally in rotten wood and under old bark.
A. exiguum Mels. Hudson Co. (Ll), g. d., rare (Li).

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Family SCYDMÆNIDÆ.

In this family and in the *Pselaphidae*, the list has been prepared by Mr. H. W. Wenzel, who has devoted special attention to collecting material for the past year or more.

He writes as follows: "In the first edition of the Catalogue the list of species in these two families was very unsatisfactory, showing that very little attention had been given to collecting these interesting little insects.

"The following list is probably by no means complete, for a number of other species will probably be found in the pine barrens and swamp districts of South Jersey. A few species from the vicinity of Philadelphia have been placed on the list, as there is every probability that they will be found under like conditions across the river.

"I am greatly indebted for the kindness extended to me by the Rev. P. Jerome Schmitt, of St. Vincent's College, for the determination of a number of the difficult forms, and also to Mr. Wm. H. Ashmead for the determination of the ants mentioned in this list."

All the notes and records not otherwise credited are furnished by Mr. Wenzel: the species are all small and their habits are indicated by the notes in the list.

EUCONNUS Thoms.

- E. ventralis* Casey. Under old leaves, I-IV, in marshes along the Delaware river near Camden (W), Snake Hill (Sf).
E. clavipes Say. Under layers of old leaves and in meadows under pieces of wood, g. d.
E. bicolor Lec. Under old leaves and moss, Camden to Anglesa, I-IV, g. d. in South Jersey (W), Snake Hill (Sf).
E. cavipennis Casey. In rotten logs, vicinity of Philadelphia, VIII, 1, under very rotten leaves, Angelsea, IV, 9
E. occultus Casey. In rotten logs, with the preceding, near Philadelphia.
E. affinis Casey. Taken from old logs: eight specimens were found in a colony of *Lasius mixtus* Nyl., vicinity of Philadelphia.
E. salinator Lec. Under old leaves g. d., I-VI: I have it from Camden, Ocean, Atlantic and Cape May Counties (W), under sticks and stones in salt marshes, Hackensack meadows (Sm).
E. fatuus Lec. Angelsea, III, 11, four examples under old leaves in swamp, Westville, VIII, 20, several specimens in wet Sphagnum (W), Snake Hill (Sf).

PYCNOPHUS Casey.

- P. rasmus* Lec. Taken from old pine log, Woodbury, VII, 23 (W), Staten Island (Lg).

CONNOPHRON Casey.

- C. oreophilum* Casey. In rotten wood, I-VIII, vicinity of Philadelphia.
C. fossiger Lec. Under old leaves and moss in damp places, g. d. in South Jersey, I-VI.
C. brevicorne Say. Lahaway, V, 23 on cranberry bogs (Sm).
C. clavicornie Casey. Collingwood, VI, 29, under leaves (W), Snake Hill (Sf).
C. longipilosum Casey. Taken from deep moss at Clementon, IX, 17, Gloucester III, 15.
C. frontale Casey. Found throughout the year under layers of dead leaves, g. d.
C. hirtellum Lec. Madison (Pr).
C. pyramidale Lec. Under bark of dead oak, VI, 8, vicinity of Philadelphia
C. trinitifer Casey. Throughout the year under dead leaves, g. d.

C. fulvum Lec. Anglesea, under rotten leaves; near Philadelphia, VII, 6, from rotten wood.

C. capillosulum Lec. A number of specimens of this beautiful species were taken from under the roots of a species of sedge, Clementon, IX, 14.

SCYDMÆNUS Lec.

S. perforatus Schaum. Woodbury, Gloucester, Clementon, g. d., under leaves and moss (W), Newark (Bf), Snake Hill (Sf), Hopatcong (Pm).

S. badius Casey. Under old bark and leaves, around roots of dead trees, VI-VIII.

S. subpunctatus Lec. Westville, IV, V, in moss.

S. pubipennis Casey. Clementon, Westville, Gloucester, VII, VIII, under deep layers of rotten leaves.

OPRESSUS Casey.

O. spec. indet. Two examples from dead oak, Clementon, VII, 27. One of the smallest species, and unfortunately both in such bad shape that they cannot be correctly determined.

EUMICRUS Lap.

E. motschulskii Lec. From very rotten wood, vicinity of Philadelphia, X, 5 (W).

CEPHENNIUM Müll.

C. corporosum Lec. Woodbury, III, 15, near Philadelphia, III, 11, under old leaves.

ASCYDMUS Casey.

A. tener Casey. Clementon, IX, 17, taken from rotten wood.

ACHOLEROPS Casey.

A. zimmermanni Schaum. One example in meadows under a board, near Philadelphia.

Family PSELAPHIDÆ.

RHEXIUS Lec.

R. insculptus Lec. Snake Hill, sweeping at dusk (Sf).

RHEXIDIUS Casey.

R. canaliculatus Lec. Anglesea, Atco, Clementon, Westville, I-VIII, under old leaves and moss, also in rotten wood, not rare.

EUPLECTUS Leach.

- E. confluent Lec. Clementon, VI, 18, from old rotten logs (W), Snake Hill (Sf).
E. pertenuis Casey. Anglesea, III, 11, one example from old leaves, also near Philadelphia.

PYCNOPECTUS Casey.

- P. sexualis Casey. Woodbury, VII, 23, one specimen from a very rotten log.
P. tenellus Casey. Near Philadelphia, VII, 16, from a very rotten log.
P. spec. indet. Females only, which cannot be named, near Philadelphia, VII, 10.
P. spec. indet. Westville, X, 8, a large female taken from a rotten log.

BIBLIOPLECTUS Reitt.

- B. ruficeps Lec. Anglesea, III, IV, under deep layers of rotten leaves, rarely.

TRIMIOPLECTUS Brend.

- T. obsoletus Brend. Near Philadelphia, VI, 13, from old rotten oak stump.

EUTYPHLUS Lec.

- E. similis Lec. Westville VIII, 20, from old pine log.

TRIMIOMELBA Casey.

- T. convexula Lec. Rather rare at all times and g. d. in damp woods under old rotten leaves.
T. dubia Lec. With the preceding, but more common.

MELBA Casey.

- M. parvula Lec. Anglesea, III and IV, under old leaves and grasses in damp places.
M. fossiger Casey. Clementon, Anglesea, VII, under old leaves (W), Lahaway, V, 28, on Cranberry bog (Sm).

DALMOSELLA Casey.

- D. tenuis Casey. Clementon, IX, 17, a single female from rotten wood.
D. sp. prob. new. Clementon, IX, 17, also from rotten wood. This genus includes the most minute species of the family.

BATRISUS Aubé.

- B. ionæ Lec. Staten Island (Lg), a single female taken from very dry oak bark with *Adranes cæcus* Lec., Anglesea, IX, 4.

- B. monstrosus* Lec., var *ferox* Lec. Laurel Spring, V, 14, from old logs and under stones with *Lasius interjectus* (W), Hopatcong (Pm).
B. schaumii Aubé. Taken from an old log near Philadelphia, VII, 20.
B. riparius Say. Anglesea, VII, under bark of old stumps.
B. lineaticollis Aubé. Staten Island (Lg).
B. globosus Lec. Under bark of old stumps and rotten logs, VI-VIII, g. d. (W), Snake Hill (Sf), Ft. Lee, Alpine, III, 14, in nest of a red ant.
B. denticornis Casey. Taken in marsh along the Delaware river front near Camden, under old leaves, XII, 30.
B. striatus Lec. Staten Island (Lg).
B. spretus Lec. Near Philadelphia, III, 18, under bark of an old oak (W), Ft. Lee (Bt).
B. triangulifer Brend. Woodbury, III, 25, in dark woods under deep layers of old leaves.
B. nigricans Lec. Under very deep layers of old leaves in marshes, along the Delaware River near Camden, IV, 15.

ARTHMIUS Casey.

- A. involutus* Casey. Clementon, IX, 14, 17, in dark woods among the roots of *Carex* sp.

DECARTHON Brend.

- D. abnorme* Lec. Under old leaves and moss, g. d., throughout the year, more common in winter and spring (W), Lahaway, V, 28, on cranberry bogs (Sm), Hopatcong (Pm), Ft. Lee, Snake Hill (Sf).
D. exsectum Brend. Anglesea, III, 11, under old leaves, three examples (W), Snake Hill (Sf).
D. longulum Brend. Orange (Ch).
D. formiceti Lec. Clementon, VII, 27, Westville, VIII, 28, under layers of old leaves and chips in damp woods, Lahaway, V, 28, on cranberry bogs (Sm), Snake Hill, Ft. Lee (Bt).

RYBAXIS Saulcy.

- R. valida* Brend. Anglesea, III, 11, under old leaves (W), Lahaway, V, 28, on Cranberry bogs (Sm).
R. conjuncta Lec. Occurs with *brendeli*.
R. brendeli Horn. Anglesea, III, 11, under old leaves (W), Lahaway, V, 28, on Cranberry bogs (Sm).
R. mystica Casey. Anglesea, V, 28, under old leaves.

BRYAXIS Leach.

- B. luniger* Lec. Anglesea, rare, a few examples only, under sea drift in June.
B. abdominalis Aubé. Anglesea, III, 11, rare under leaves (W), Staten Island, salt meadows under chips (Lg).

- B. dentata* Say. Anglesea, III, 11, IX, 4, under old leaves.
B. terebrata Casey = *perforata* Brend. Snake Hill, sweeping at dark (Sf).
B. perpunctata Brend. Anglesea, V, 30, a single example near the beach.

REICHENBACHIA Leach.

- R. congener* Brend. Anglesea, common in damp moss in winter (W), Lahaway, V, 28, on cranberry bogs (Sm), Snake Hill (Sf), Staten Island (Lg).
R. scabra Brend. Anglesea, II, 25, Camden, IV, 45, under layers of old leaves and seems to be rare.
R. rubicunda Aubé. Common in damp places under old leaves and moss, g. d.
R. insolita Casey. Anglesea V, under old leaves.
R. puncticollis Lec. Anglesea, common in damp moss in winter (W), Lahaway, V, 28, on cranberry bogs (Sm).
R. inepta Casey. Anglesea, III, 18, under old leaves.
R. polita Brend. Anglesea, II, 25, III, 11, rare under old leaves and moss.
R. propinqua Lec. Anglesea, under old leaves (W), Lahaway, V, 28, on cranberry bogs (Sm).

NISAXIS Casey.

- N. tomentosa* Aubé. Hopatcong (Pm), Snake Hill, one specimen (Sf).

EUPSENIUS Lec.

- E. glaber* Lec. Snake Hill, one specimen (Sf).

BYTHINUS Leach.

- B. tychoides* Brend. This very rare species was found under very deep layers of old leaves, Anglesea and Westville, I-IV.

CYLINDRARCTUS Schf.

- C. testaceus* Casey. Atco, Woodbury, Westville, II-VII, 15, under deep layers of old leaves.

TYCHUS Leach.

- T. minor* Lec. Snake Hill, 1 specimen (Sf); this is probably the same as the next species.
T. sp. indet. This species is not rare and found throughout South Jersey under old leaves in damp woods from I-VIII.

PSELAPHUS Hbst.

- P. erichsoni* Lec. Hopatcong (Pm), Ft. Lee, (Bt), Newark (Bf).
P. fustifer Casey. Anglesea, I-IV; a number of this beautiful species were taken under old leaves: I have not taken it during the summer months.

SOGNORUS Reit. = CTENISTES.

- S. piceus* Lec. Taken abundantly, g. d., with the sieve in winter, under boards and stones in early spring (W), Camden (Li), Hudson Co. (Ll).
S. consobrinus Lec. Occurs with the preceding and in equal abundance.

CEOPHYLLUS Lec.

- C. monilis* Lec. Near Philadelphia, VIII, 2, from old rotten log, with *Lasius interjectus* Mayr., Clementon, IX, 14, under similar conditions.

TMESIPHORUS Lec.

- T. costalis* Lec. Clementon, VI, 28, VIII, 27, a number of specimens from old pine logs, probably living in holes made by *Dendroctonus*.
T. carinatus Say. Several examples with the preceding and on the same date.

CEDIUS Lec.

- C. ziegleri* Lec. Hopatcong (Pm), Ft. Lee, in ant hills (Bt).

TYRUS Aubé.

- T. humeralis* Aubé. Gloucester, VIII, 17, from rotten pine log.

ADRANES Lec.

- A. cœcus* Lec. Anglesea, V, 28, a number of specimens from an old R. R. tie infested by a large colony of *Lasius mixtus* Nyl; also sifted from under leaves and moss, Clementon, Woodbury, and Laurel Springs, I and VII (W), Staten Island (Lg).
A. lecontei Brend. Two examples taken from an old log with *Lasius mixtus* Nyl., near Philadelphia, VII, 31 (W), Staten Island (Lg).

Family STAPHYLINIDÆ.

"Rove beetles"; known by the very short wing covers, leaving most of the slender, flexible abdomen exposed. Usually long and slender in form, with moderately clubbed antennæ. They live generally on decaying animal or vegetable matter, excrement, fungi or in fermenting sap, and are the most universally distributed of all beetles. A few of them are predatory in habit and some have been accused of feeding on living plants; but on the whole they are of some importance to the Agriculturist as they aid in reducing his manure heap and the manure when spread, into a form available to the plants.

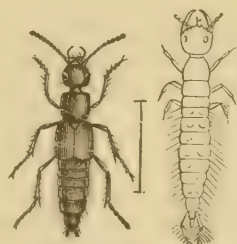


Fig. 83.—Staphylinid and its larva.

The collections are far from complete and many are not determined; our largest additions in the list of New Jersey Coleoptera will probably come, in future, in this family.

FALAGRIA Mann.

- F. cingulata* Lec. "New Jersey" (U S N M).
F. bilobata Say. Camden, III, 30 (Rk).
F. dissecta Er. Ft. Lee (Bt), Woodbury, V, 5, 15 (Rk).
F. venustula Er. Ft. Lee, IV, 2 (Bt), Westville, IV, 27 (Rk).

HOPLANDRIA Kraatz.

- H. lateralis* Mels. Westville, V, 5 (Rk).

HOMOLOTA Mann.

- H. plana* Gyll. New Jersey (U S N M).
H. trimaculata Er. Ft. Lee (Bt), New Jersey (U S N M).
H. modesta Mels. Ft. Lee (Bt).
H. analis Grav. Ft. Lee (Bt), Camden, III, 30, Westville, IV, 27 (Rk).
H. lividipennis Mann. Ft. Lee (Bt), Cramer Hill, V, 30, Westville, IV, 27, VI, 16, Longport, VI, 12, Beesley's Point, III, 23 (Rk).
H. pallitarsis Kirby. Westville, VI, 16 (Rk).
 Other species of this genus are yet unnamed in collections.

LOMECHUSA Grav.

- L. cava* Lec. Clifton, in ant hills (Bt), Ft. Lee (Joutel), Snake Hill with ants (Ll); occurs with *Camponotus pennsylvanicus* and *C. vicinus*, in colonies, usually in logs.

TACHYUSA Er.

- T. cavicollis* Lec. Snake Hill, Ft. Lee, South Orange (Sf), "New Jersey" (U S N M).
T. nigrella Lec. "New Jersey" (U S N M).

POLYSTOMA Steph.

- P. maritima* Casey. Longport, VI, 12 (Rk), Brigantine beach, IX (Hn), Cape May, VII (Sz).
P. n. sp., Sz. dixit. Longport, VI, 12 (Rk).

ALEOCHARA Grav.

- A. lata* Grav. Hopatcong (Pm), Ft. Lee (Bt), Clementon, IV, 16 (Rk), g. d. (W); common under dead animal matter: the other species chiefly under excrement.
A. brachypterus Fourc. Hopatcong (Pm), "New Jersey" (U S N M).

- A. bimaculata* Grav. Common throughout the State all season.
A. nitida Grav. Cramer Hill, Westville, V, 5, 30, Da Costa, Atco, VI, 3, 22 (Rk), "New Jersey" (U S N M).
A. fuscipes Grav. Newark (Rk).

OXYPODA Mann.

- O. sagulata* Er. "New Jersey" (U S N M).

GYROPHÆNA Mann.

- G. vinula* Er. Hopatcong (Pm), Fort Lee (Bt), throughout the State, in toadstools.

MYLLÆNA Er.

- M. fuscipennis* Kraatz. Snake Hill, one specimen (Sf).
M. rufipennis Sz. Anglesea, VIII (Sz); the species occur among moist leaves and in flood debris (U).

ACYLOPHORUS Nordm.

- A. pronus* Er. Hopatcong (Pm), Madison (Pr), Ft. Lee (Bt), Palisades, Snake Hill (Ll), Camden, III, 30 (Rk); common where found: occurs under debris near water.

HETEROTHOPS Steph.

- H. fumigatus* Lec. New Jersey (U S N M).

QUEDIUS Steph.

- Q. fulgidus* Fabr. Ft. Lee (Bt), Caldwell (Cr), Hudson Co. (Ll), Westville, II, 24, Merchantville X, 1 (W).
Q. peregrinus Grav. "New Jersey" (Horn, U S N M), Westville, V, 15 (Rk).
Q. capucinus Grav. Hudson County (Ll), Anglesea (W), "New Jersey" (Horn, U S N M).
Q. lævigatus Gyll. Hudson Co. (Ll), Brigantine, mainland, IX.
Q. molochinus Grav. Hudson Co. (Ll), New Jersey (U S N M).
Q. brunneipennis Mann. Brigantine beach, IX (Hn), Anglesea, V, 28 (W).
Q. ferox Lec. Hudson Co., rare (Ll), Hopatcong (Pm).
Q. vernix Lec. Hudson County, rare (Ll), Newark (Soc), "New Jersey" (U S N M).

LISTOTROPHUS Perty.

- L. cingulatus* Grav. Throughout the State under decaying vegetable and animal matter, including human excrement.
L. capitatus Bland. "New Jersey" (U S N M): rare.

CREOPHILUS Kirby.

- C. villosus* Grav. Throughout the State on or under dead animals, more rarely on excrement.

STAPHYLINUS Linn.

- S. badipes* Lec. Orange Mts. (Rk), Newark, Anglesea, VI, 28 (W).
S. vulpinus Nordm. Throughout the State and all seasons, in decaying matter generally.
S. maculosus Grav. Throughout the State, usually under excrement; our largest species.
S. mysticus Er. Throughout the State, IV-VII, in decaying vegetable matter and under stones.
S. tomentosus Grav. Hopatcong (Pm), Greenwood Lake, Snake Hill (Bt), Hudson Co. (Ll), Newark (Soc), Brigantine beach, IX (Hn).
S. fossator Grav. Hopatcong (Pm), on mushrooms, VI-IX (Bt), Orange Mts. (Rk), Brigantine, mainland, IX (Hn), g. d. (W).
S. cinnamopterous Grav. Throughout the State; our most common species.
S. violaceus Grav. Madison (Pr), Fort Lee under bark only (Bt), Spring Lake in fungi (Ch), g. d. (W).
S. viridans Horn. Hopatcong (Bt).
S. prælongus Mann. Orange Mts. (Rk), Snake Hill (Bt), Hudson Co. (Ll), Brigantine beach, IX (Hn), Anglesea, VII (Sz), very common under drift, V, 28 (W).

OCYPUS Kirby.

- O. ater* Grav. Hopatcong (Pm), Ft. Lee, under stones (Bt), Caldwell (Cr), Hudson Co. (Ll), Brigantine beach, IX (Hn), Longport, VIII, 8 (Rk), g. d. (W).

BELONUCHUS Nordm.

- B. formosus* Grav. Orange Mts. (Rk), Ft. Lee, V (Bt), Hudson Co. (Ll), Newark (Soc), g. d. (W); on sap of wounded trees.

TYMPANOPHORUS Nordm.

- T. puncticollis* Er. Camden, XI, 23 (W).

PHILONTHUS Curt.

- P. æneus* Rossi. Hopatcong (Pm), Fort Lee, IV, 11 (Bt), Snake Hill, IV, 26 (Lv), Caldwell (Cr), Newark (Soc), Highlands, Spring Lake (Ch), Brigantine beach, IX (Hn). Species in this genus are largely feeders in fungi, on sap and in vegetable decay.
P. sericinus Horn. Hudson County, rare (Ll), Newark (Soc), "New Jersey" (USNM).
P. umbratilis Grav. Westville, VIII, 16 (Rk), "New Jersey" (Horn).

- P. lætulus* Say. Orange Mts. (Rk), Newark (W), "New Jersey" (U S N M).
P. politus Fabr. Orange Mts. (Rk).
P. hepaticus Er. Hudson Co. (Ll), Westville, V, VI, Cramer Hill, Woodbury, V, 14, 30, Beesley's Point, VIII, 23 (Rk), Brigantine beach, IX (Hn), g. d. (W).
P. umbrinus Grav. Ft. Lee (Bt), Hudson Co. (Ll), Brigantine beach, IX (Hn), Anglesea (W); always rare.
P. quadricollis Horn. Newark (Soc), Beesley's Point, VIII, 23 (Rk).
P. debilis Grav. Westville (W), Camden, III, 30 (Rk), Spring Lake, in cowdung (Ch), "New Jersey" (U S N M).
P. varians Payk. "New Jersey" (U S N M).
P. longicornis Steph. Ft. Lee (Bt), Hudson Co. (Ll), g. d. (W).
P. discoideus Grav. Ft. Lee, in mushrooms (Bt), Hudson County (Ll), "New Jersey" (U S N M).
P. alumnus Er. Common throughout the State.
P. fusiformis Mels. Woodbury, V, 22 (Rk), Brigantine beach, IX, common (Hn).
P. thoracicus Grav. Merchantville, X, 1 (W).
P. schwarzii Horn. Snake Hill (Ll), Newark (Soc); rare.
P. lomatus Er. Throughout the State, common.
P. cunctans Horn. Orange Mts., Westville, IV, 27 (Rk).
P. brunneus Grav. Common throughout the State.
P. cyanipennis Fabr. Common throughout the State in mushrooms, VII, VIII, IX.
P. blandus Grav. Ft. Lee (Bt), Hudson Co. (Ll), Newark (Soc), Brigantine, mainland IX (Hn).
P. sordidus Grav. Hudson Co. (Ll), Longport, VI, 12 (Rk).
P. cephalotes Grav. Ft. Lee (Bt), Hudson Co. (Ll).
P. nigritulus Grav. Hopatcong (Pm), Ft. Lee (Bt), Hudson Co. (Ll), "New Jersey" (U S N M).
P. microphthalmus Horn. Hopatcong (Pm), Cramer Hill, Westville, V, 30, (Rk), Brigantine beach, IX (Hn), Anglesea, VII (Sz).
P. baltimorensis Grav. Throughout the State, V-IX, but not common.
P. apicalis Say. Ft. Lee, one spec. (Bt), Caldwell (Cr), Camden, Gloucester Co. (W); always rare.

ACTOBIUS Steph.

- A. cinerascens* Grav. Hudson Co. (Ll), Westville, V, 27 (Rk), "New Jersey" (U S N M). The "New Jersey" material in the U S N M in the family Staphilinidæ is almost entirely from the region along the base of the Palisades and the salt meadows around Snake Hill.
A. nanus Horn. Hudson Co. (Ll), DaCosta (W), "New Jersey" (Horn).

- A. sobrinus* Er. Hudson Co., (Ll), Eagle Rock, Hemlock Falls, VI, 4, Camden, III, 30, Westville, IV, 22, V, 5, 27, Clementon, V, 10 (Rk), g. d. (W).
- A. parvus* Horn. Hudson Co. (Ll), Lahaway, V, 28.
- A. pæderoides* Lec. Hudson Co. (Ll), Brigantine Beach, IX (Hn), Anglesea (W), Ocean Co., V.

CAFIUS Steph.

- C. bistriatus* Er. Highlands (Ch), Longport, VI, 12, Beesley's Point, VII, 23 (Rk), Brigantine Beach, IX (Hn), Anglesea, Cape May, VII (Sz).

XANTHOLINUS Serv.

- X. cephalus* Say. Throughout the State, usually common: under pine bark (Ch).
- X. fulgidus* Fab. New Jersey—probably Chester (Dkn).
- X. obsidianus* Mels. Ft. Lee (Bt), Eagle Rock, VI, 5 (Rk), g. d. (W), "New Jersey" (U S N M): under rubbish in gardens (Ch).
- X. emmesus* Grav. Ft. Lee (Bt), Hudson Co. (Ll), Spring Lake in fungus (Ch), Lakewood.
- X. obscurus* Er. Weehawken, V, 2 (Bt), Hudson Co. (Ll), Clifton (Ch), Westville, I, 28 (W), V, 5 (Rk), Anglesea, VII (Sz).
- X. sanguinipennis* Lec. Hudson Co. (Ll), Beesley's Point, VII, 23 (Rk), Anglesea, Cape May, VII (Sz).
- X. pusillus* Sachse. Hudson Co. (Ll).
- X. hamatus* Say. Hudson Co. (Ll), Westville, V, 30 (Rk).

LEPTOLINUS Kraatz.

- L. rubripennis* Lec. Westville, IV, 22, V, 27 (Rk), Lahaway, VI, 28, on cranberry bogs.

LEPTACINUS Er.

- L. batychrus* Gyll. "New Jersey" (U S N M).

DIANOUS Sam.

- D. chalybeus* Lec. Staten Island, on stones at foot of a waterfall, IV, XI, abundant (Lg).

STENUS Latr.

- S. bipunctatus* Er. "New Jersey" (U S N M).
- S. junio* Fabr. Hopatcong (Pm), Swinefield Bridge, V, 20 (Pr), Weehawken, V, 2 (Bt), Palisades, Snake Hill, common in spring, (Ll), Orange (Ch).
- S. femoratus* Say. Hudson Co. (Ll), "New Jersey" (U S N M).
- S. strangulatus* Casey. Lahaway, V, 28, on cranberry bogs.
- S. intrusus* Casey. Lahaway, V, 28, on cranberry bogs.

- S. erythropus* Mels. Westville, III, 22, Woodbury, V, 19 (Rk), Lahaway, V, 28, on cranberry bogs.
- S. inornatus* Casey. Lahaway, V, 28, on cranberry bogs.
- S. pluto* Casey. Woodbury, VI, 7 (Rk).
- S. atomarius* Casey. Lahaway, V, 28, on cranberry bogs.
- S. colonus* Er. Westville, V, 19, Longport, VI, 12 (Rk), "New Jersey" (U S N M).
- S. stygius* Say. Philadelphia Neck, III, 16 (Rk), New Jersey (U S N M).
- S. egenus* Er. Lahaway, V, 28, on cranberry bogs.
- S. sectilifer* Casey. Anglesea, VII (Sz).
- S. pudicus* Casey. Camden, III, 5 (W), Lahaway, V, 28, on cranberry bogs.
- S. humilis* Er. Lahaway, on cranberry bogs, V, 28.
- S. n. sp.* Casey dixit. Lahaway, V, 28, on cranberry bogs.

AREUS Casey.

- A. flavicornis* Er. Weehawken, V, 2 (Bt), Palisades, Snake Hill, spring, abundant (Ll), Merchantville, V, 30 (Rk).
- A. annularis* Er. Camden, III, 5, with the preceding in the eastern localities.
- A. reconditus* Casey. New Jersey (U S N M).
- A. arcus* Er. Woodbury, VI, 7 (Rk), Anglesea, VII (Sz).
- A. punctatus* Er. Ft. Lee (Bt), Hudson Co. (Ll), Westville, V, 5, VI, 7 (Rk), Camden, III, 5, Anglesea (W).

EUÆSTHETUS Grav.

- E. americanus* Er. Snake Hill (Sf), Weehawken, IV, 2 (Bt), Westville, I, 28, and g. d. (W); occurs in fungi.

CRYPTOBIUM Mann.

- C. badium* Grav. Snake Hill (Ll), "New Jersey" (U S N M).
- C. lugubre* Lec. Brigantine Beach, IX, occasional (Hn).
- C. bicolor* Grav. Madison (Pr), Hudson Co. (Ll), Spring Lake (Ch), Anglesea (W), Lahaway on cranberry bog, V, 28.
- C. carolinum* Er. Camden, III, 3, Westville, V, 5 (Rk), Anglesea (W).
- C. pallipes* Grav. Common throughout the State.
- C. latebricola* Nordm. Camden, III, 30, Westville, V, 5, Woodbury, V, 22, VI, 7 (Rk), Brigantine Beach, IX (Hn), Lahaway, V, 28, on cranberry bogs.
- C. cribratum* Lec. Hopatcong (Pm), Madison (Pr), Ft. Lee (Bt), Hudson Co. (Ll), Philadelphia Neck, III, 26 (Rk).

LATHROBIUM Grav.

- L. grande* Lec. Westville, I, 28 (W), "New Jersey" (U S N M).
L. punctulatum Lec. Hopatcong (Pm), Hudson Co. (Ll), Camden, III, 30 (Rk), Westville, I, 28 (W), Anglesea, VII (Sz).
L. nitidulum Lec. Lahaway, V, 28, on cranberry bogs.
L. puncticeps Lec. Lake Hopatcong (Pm).
L. armatum Say. Hopatcong (Pm), Newark (Soc).
L. simile Lec. Madison (Pr), Ft. Lee (Bt), Hudson Co., (Ll), Westville, VI, 22 (Rk), Anglesea (W).
L. confusum Lec. Camden, II, 3 (W).
L. seriatum Lec. Brigantine beach, IX (Hn).
L. longiusculum Grav. Hoboken, V, 24 (Bt), Hudson Co., (Ll), Newark (Soc), Brigantine beach, IX (Hn).
L. collare Er. Woodbury, V, 22, VI, 12, 16, Longport (Rk), Anglesea (W), New Jersey (U S N M).
L. dimidiatum Say. Brigantine beach, IX (Hn), Anglesea, II, 22 (W).

SCOPÆUS Er.

- S. opacus* Lec. "New Jersey" (Dkn), Camden, III, 5 (W).
S. exiguus Er. Madison (Pr).

STILICUS Latr.

- S. opaculus* Lec. "New Jersey" (U S N M).
S. angularis Lec. Hudson Co., (Ll), Spring Lake (Ch), Anglesea, VII (Sz), g. d. (IV).
S. dentatus Say. Hopatcong (Pm), Lahaway, V, 28, on cranberry bogs.
S. biarmatus Lec. Newark (Soc).

MEGASTILICUS Casey.

- M. formicarius* Casey. Alpine, III, 10, in nest of a red ant (Bt), near Newark, in ant hills, not rare (Soc).

LITHOCHARIS Er.

- L. corticina* Grav. "New Jersey" (U S N M), Anglesea, g. d. (W); common under bark.
L. confluens Say. Throughout the State, rather common: often in fungi.
L. obsoletus Nordm. Anglesea (W).

DACNOCHILUS Lec.

- D. angularis* Er. Anglesea (W).

PÆDERUS Grav.

- P. littorarius* Grav. Throughout the State, spring and fall, under stones in damp fields, under rubbish along shore, rarely in fungi.
P. obliteratus Lec. Brigantine beach, IX, not common (Hn).

SUNIUS Steph.

- S. prolixus* Er. Newark (Soc), Brigantine beach, IX (Hn).
S. binotatus Say. Chester (Dkn), Ft. Lee (Bt), Westville, IV, 27, V, 31 (Rk), Anglesea (W).
S. longiusculus Mann. Hudson Co. (Ll), Hopatcong (Pr), Ft. Lee, under stones in spring (Bt), Madison (Pr), Westville, V, 27 (Rk), Camden, Gloucester Co. (W).

STILICOPSIS Sachse.

- S. monstrosa* Lec. Snake Hill (Sf), Westville, I, 28 (W).

PINOPHILUS Grav.

- P. latipes* Grav. Ft. Lee (Joutel), Woodbury, V, 22 (Rk), Anglesea (W).

PALAMINUS Er.

- P. normalis* Lec. Anglesea, VII (Sz).
P. testaceus Er. Snake Hill (Sf), Eagle Rock, VI, 9 (Rk), Westville, I, 28, sifting (W).

TACHINUS Grav.

- T. memnonius* Grav. Ft. Lee on mushrooms (Bt), "New Jersey" (U S M N).
T. repandus Horn. "New Jersey" (U S N M), Camden, XII, 12, Anglesea (W).
T. flavipennis Dej. Eagle Rock, VI, 5 (Rk), "New Jersey" (U S N M).
T. fimbriatus Grav. Ft. Lee on mushrooms (Bt), Orange Mts. (Rk), Camden, Gloucester Co. (W), Brigantine beach (Hn).
T. picipes Er. Collingwood (W).
T. limbatus Mels. Anglesea (W), "New Jersey" (Rk, U S N M).
T. pallipes Grav. "New Jersey," III, 26 (Rk), on mushrooms (Bt), Camden, Gloucester Co. (W).

TACHYPORUS Grav.

- T. elegans* Horn. Hopatcong (Pm), Chester (Dkn), Madison (Pr): this and the other species mostly in fungi or in sap.
T. jocosus Say. Madison (Pr), Camden, Gloucester Co. (W), "New Jersey" (U S N M).

T. chrysomelinus Linn. Ft. Lee (Bt), Brigantine beach, IX (Hn), "West Jersey" (U S N M).

T. brunneus Er. Ft. Lee, Weehawken, IV, 2 (Bt), Camden, Gloucester Co. (W), "New Jersey" (U S N M).

CILEA Duval.

C. silphoides Linn. Hemlock Falls, VII, 4 (Rk).

ERCHOMUS Mots.

E. ventriculus Say. Common throughout the State in fungi and in soft decay.

E. lævis Lec. Anglesea, sifting, all winter (W).

CONOSOMA Kraatz.

C. littoreum Linn. Spring Lake (Ch).

C. crassum Grav. Ft. Lee (Bt), "New Jersey" (U S N M), g. d., common (W); this and the other species occur in fungi on trees or under old leaves and bark, probably throughout the State.

C. pubescens Payk. Throughout the State; the most common of our species.

C. basale Er. Spring Lake, under bark (Ch), "New Jersey" (Rk, U S N M).

C. opicum Say. Ocean Co., under bark.

BOLETOBIUS Leach.

B. cingulatus Mann. Madison (Pr), Newark (Soc); all the species in decaying fungi.

B. intrusus Horn. Spring Lake (Ch), Brigantine, mainland, IX (Hn), "New Jersey" (U S N M).

B. cincticollis Say. Spring Lake (Ch), "New Jersey" (U S N M).

B. anticus Horn. Ft. Lee (Bt), "New Jersey" (U S N M).

B. pygmæus Fabr. Brigantine, mainland, IX (Hn).

B. trinotatus Er. Hopatcong (Pm), Ft. Lee (Bt), Highlands (Ch), Westville, DaCosta (W), Brigantine, mainland, IX (Hn), Anglesea, VII (Sz).

B. cinctus Grav. Common throughout the State.

var. *gentilis* Lec. Brigantine, mainland, IX (Hn).

BRYOPORUS Kraatz.

B. rufescens Lec. "New Jersey" (U S N M).

MYCETOPORUS Mann.

M. americanus Er. Madison (Pr), Spring Lake (Ch), Merchantville, V, 30 (Rk), Anglesea, VII (Sz); under old leaves, &c.

M. humidus Say. Lake Hopatcong (Pm).

OXYPORUS Fabr.

- O. femoralis* Grav. Hopatcong (Pm). Ft. Lee (Sf), Orange Mts., (Bt), Camden, Gloucester Co. (W): all the species in fungi.
- O. austrinus* Horn. Madison, IX, 12 (Pr).
- O. major* Grav. Ft. Lee, VIII, on mushrooms (Bt), Camden, Gloucester Co. (W).
- O. rufipennis* Lec. Ft. Lee, (Bt).
- O. vittatus* Grav. Hopatcong (Pm), Ft. Lee, VIII (Bt), DaCosta (W).
- O. bicolor* Fauv. DaCosta (W).
- O. lateralis* Grav. Ft. Lee (Sf), VIII (Bt), Orange Mts. (Rk), Camden, Gloucester Co. (W), New Jersey (U S N M).

BLEDIUS Leach.

- B. pallipennis* Er. Newark (Soc).
- B. mandibularis* Er. Brigantine, IX (Hn), Sea Isle City (W), Anglesea in salt marshes, digging in the wet sand: all stages, VII, 4, adults only in September.
- B. brevidens* Lec. Atlantic Co. (W): Mr. Schwarz suggests that these three names are all forms of one species.
- B. politus* Er. Brigantine beach, salt marshes, IX (Hn), Anglesea, (W).
- B. semiferrugineus* Lec. Woodbury, V, 22 (Rk), Lahaway, V, 28, on cranberry bogs.
- B. rubiginosus* Er. Woodbury, VII, 30 (W).
- B. basalis* Lec. Brigantine beach, salt meadows, IX (Hn), Anglesea, VII (Sz), not rare.
- B. cordatus* Say. Brigantine beach on salt marshes, common (Hn), Anglesea (W).
- B. neglectus* Casey. "New Jersey" (Rk).

PLATYSTETHUS Mann.

- P. americanus* Er. Throughout the State, common in cow-dung, half dried out.

OXYTELUS Grav.

- O. sculptus* Grav. Woodbury, V, 22 (Rk): most of the species occur in decaying vegetation.
- O. rugosus* Grav. Hopatcong (Pm), "New Jersey" (U S N M).
- O. pennsylvanicus* Er. "New Jersey" (U S N M).
- O. insignitus* Grav. Our most common species: on cow-dung throughout the State.
- O. nitidulus* Grav. "New Jersey" (U S N M).
- O. depressus* Grav. Madison (Pr).
- O. exiguus* Er. Ft. Lee (Bt), Anglesea, VII (Sz).

TROGOPHLEUS Mann.

- T. arcifer* Lec. "New Jersey" (U S N M).
T. 4-punctatus Say. Camden, Gloucester Co. (W), New Jersey (U S N M);
 the species occur on mud banks or among decaying leaves in muddy
 swamps.
T. nanulus Casey. Cape May (Casey).
T. pudicus Casey. Cape May (Casey).
T. convexulus Lec. Longport, VI, 12 (Rk).
T. simplarius Lec. Eagle Rock, VII, 5 (Rk), Anglesea, VII (Sz).
T. providus Casey. Atlantic City, Cape May (Casey).
T. confusus Casey. Cape May (Casey).

APOCELLUS Er.

- A. sphæricollis* Say. Brigantine beach, IX (Hn), "New Jersey" (U S N M).

GEODROMICUS Redt.

- G. cæsus* Er. Cramer Hill, V, 30 (Rk), Gloucester, Camden Co. (W).
G. nigrita Mull. Bucks Co., Penn., and should also be found in New Jersey
 (Rk).

LESTEVA Latr.

- L. pallipes* Lec. Lahaway, V, 28, on cranberry bog.

OLOPHRUM Er.

- O. obtectum* Er. Snake Hill (Sf), Madison (Pr), Newark (Soc).

HOMALIUM Grav.

- H. repandum* Er. Lahaway, V, 28, on cranberry bogs.
H. rufipes Grav. "New Jersey" (U S N M).

LISPINUS Er.

- L. exiguus* Er. Ft. Lee (Bt).

GLYPTOMA Er.

- G. costale* Er. Ft. Lee (Bt), New Jersey (U S N M); found not rarely under
 bark, foot of palisade district.

TRIGA Fauv.

- T. picipennis* Lec. Snake Hill (Sf), Philadelphia, VII, 12 (Rk).

ELEUSIS Lap.

- E. pallidus* Lec. Snake Hill, sweeping at dusk (Sf).

Family TRICHOPTERYGIDÆ.

Extremely minute species, living in decaying vegetable matter, sometimes in manure, with slender fringed wings and of no economic importance.

PTILIUM Er.

P. hornianum Matth. Anglesea, VII (Sz).

PTENIDIUM Er.

P. ulkei Matth. Cape May, VII (Sz).

P. atomaroides Mots. Cape May, VII, strictly maritime (Sz).

LIMULODES Matth.

L. paradoxus Matth. "New Jersey" (Lg).

TRICHOPTERYX Kirby.

T. moerens Matth. Gloucester, II, 7, Camden, III, 4, sifting (W).

T. haldemanni Lec. Anglesea, VII (Sz), g. d., common (W).

NEPHANES Thom.

N. læviusculus Matth. Camden, Gloucester, sifting (W).

Family SCAPHIDIIDÆ.

A small family of generally black, shining species, sometimes marked with red or yellow spots, living in rotten wood, fungi and the like; therefore not of economic importance. They are most abundantly found in winter, sifting, and a number are yet undetermined in collections.

SCAPHIDIUM Oliv.

S. quadriguttatum Say. Newark, g. d. (Bf), Lakewood (Sm), g. d. (Li).

var. *obliteratum* Lec. Madison, VIII, 21 (Pr).

var. *piceum* Mots. Greenwood Lake, V, 22 (Lv), and with the type.

var. *4-pustulatum* Say. Woodside, 1 specimen (Bf).

BÆOCERA Er.]

B. specularifer Casey. Westville, I, 28 (W).

B. apicalis Lec. Camden, winter, sifting (W), Lahaway, V, 28.

SCAPHISOMA Leach.

- S. convexum* Say. Newark district in early spring (Bf), g. d. (W, Li), throughout the winter, sifting (W), Lakewood.
S. punctulatum Lec. Lake Hopatcong (Pm).
S. rufulum Lec. Newark district (Bf).

TOXIDIUM Lec.

- T. gammaroides* Lec. Woodside, Newark, Orange Mts., IV, 3, III, 7 (Bf), Jamesburg, VII, 4.
-

Family PHALACRIDÆ.

Small, black, shining beetles, very convex in shape, tips of wing covers often reddish, living on flowers or under bark and of no economic importance.

PHALACRUS Payk.

- P. politus* Mels. Arlington meadows (Bf), Snake Hill, Fort Lee (Sf), Ocean Co, V, 20.
P. pumilio Lec. Arlington meadows (Bf).

OLIBRUS Er.

- O. lecontei* Casey. Clementon (Li), "Atlantic States" (Casey).
O. pallipes Say. Orange Mts. (Bf), Lahaway, V, VI.
O. rufipes Lec. Orange Mts., IV, 5 (Bf).
O. consimilis Marsh. Hopatcong (Pm), Newark (Soc), g. d. (W).
O. nitidus Mels. Anglesea, VII, 23.

STILBUS Seid.

- S. nitidus* Mels. Hopatcong (Pm), Ft. Lee, on fresh cow-droppings (Bt), Hudson Co. (Li), g. d. (W, Li).
S. subalutaceus Casey. Cape May (Casey).

LITOCRUS Er.

- L. pulchellus* Lec. Woodbury, VIII, 7, sifting (W).
L. immaculatus Casey. "New Jersey" (Casey).

Family CORYLOPHIDÆ.

Very small species, varying in shape, black or brown, marked with yellow, among fermenting sap, in rotting fruits or in decaying vegetation: not of economic importance. May be beaten from dead branches or found hiding under bark.

SACIUM Lec.

- S. amabile* Lec. Anglesea, VII (Sz).
S. fasciatum Say. Anglesea, VII (Sz), Newark (Soc), Orange Mts., common (Bf), Ft. Lee (Sf), Jamesburg, V, 10.
S. lunatum Lec. Anglesea, VII (Sz), Orange Mts. (Bf), Fort Lee, Snake Hill (Sf).
S. nova species Schwarz. Anglesea, VII.
S. splendens Schwarz. Fort Lee, three specimens (Sf).

ARTHROLIPS Woll.

- A. miscellum* Lec. Eagle Rock, one specimen (Bf).

CORYLOPHODUS Matth.

- C. truncatus* Lec. Anglesea (W).
C. marginicollis Lec. Hopatcong (Pm), Fort Lee (Sf), Orange Mts.

SERICODERUS Steph.

- S. flavidus* Lec. Fort Lee (Sf).

RHYPOBIUS Lec.

- R. marinus* Lec. Brigantine beach, IX (Hn), Anglesea, VII (Sz), by sifting drift on beach (W).

ORTHOPERUS Steph.

- O. glaber* Lec. Camden, Gloucester Co. (W), Anglesea, VII (Sz), Lahaway, V, 28, on cranberry bogs.
O. scutellaris Lec. Anglesea, VII (Sz).

Family COCCINELLIDÆ.

The "Lady-birds" or "lady-bugs"; red or yellow with black spots, or black with red or yellow spots, more or less hemispherical in shape, sometimes a little more oval in outline. The larvæ are rather slender, fusiform, prettily marked with black, blue and orange. With one exception all our species are predatory and feed upon plant-lice, scale insects or other plant-feeding larvæ or grubs. They are of the greatest economic importance and are one of nature's principal checks to plant lice increase. The scale feeders are chiefly the small, black forms, the red or orange species taking only the crawling larvæ incidentally. In its predatory habits the family as a whole is exceptional among the clavicorns, or types with club-tipped antennæ.

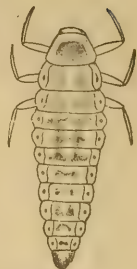


Fig. 84.—Coccinellid larva.

ANISOSTICTA Dup.

A. strigata. Thunb. Chester (Dn), Snake Hill, V, 17 (Bf), Hudson Co. (L1), Westville (Li).

NÆMIA Muls.

N. seriata Melsh. Occurs along shore July to September, frequently washed up: Snake Hill, V, 17 (Bf), found in numbers during spring in swamps at Merchantville and Westville (W).

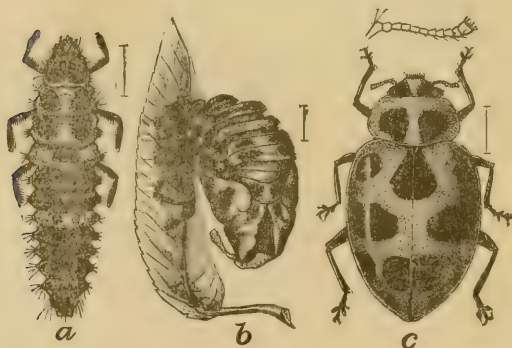
MEGILLA Muls.

Fig. 85.—*Megilla maculata (fuscilabris)*: *a*, larva; *b*, pupa; *c*, adult: enlarged.

M. fuscilabris Muls.=*maculata* DeG. Throughout the State, commonly, hibernates in masses and has a wide range of food, including pollen and fungus spores as well as plant lice and other soft insects.

HIPPODAMIA Chevr.

- H. 13-punctata* Linn. Newark district g. d. (Bf), Ft. Lee (Bt), Caldwell (Cr).
H. glacialis Fabr. Throughout the State, common: an effective enemy to the melon louse, feeding also on a variety of other plant lice.
H. convergens Guer. Common throughout the State with habits like *glacialis*.
H. parenthesis Say. Also common all season in all sections, feeding on plant lice.



Fig. 86.—*Hippodamia convergens*, larva, pupa and adult.

ADALIA Muls.

- A. bipunctata* Linn. Common everywhere on all kinds of plants and one of the most effective checks to plant lice in general.

COCCINELLA Linn.

- C. 9-notata* Hbst. Common throughout the State and the most general feeder on plant lice of all kinds.
C. perplexa Mels. = *3-fasciata* Linn. On willow, g. d. in Newark district (Bf), Hoboken (Sf), Madison (Pr), Toms River, (Bt).



Fig. 87.—9-spotted "lady bird."

CYCLONEDA Crotch.

- C. munda* Say. = *sanguinea* Linn. Common throughout the State.

CLEIS Muls. = HARMONIA.

- C. picta* Rand. Throughout the State, but local and rarely common: on pine trees end of April (W).

ANATIS Muls.

- A. 15-punctata* Oliv. Reported from all parts of the State: especially abundant on Maple plant-lice in cities and towns.

NEOMYSIA Casey.

- N. pullata* Say. Hopatcong (Pm), Newark (Bf), Highlands, Orange (Ch), Westville (Li): exclusively on pine trees (U), in April and May (W).

PSYLLOBORA Chev.

- P. 20-maculata* Say. Common throughout the State.

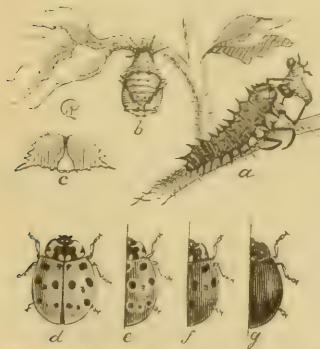


Fig 88 —15-spotted "lady-bird": a, larva devouring slug of potato beetle; b, pupa; d, e, f, g, variations of adult.

EPILACHNA Chev.

- E. borealis Fabr. The "squash lady bird." feeds in all stages on cucurbs and sometimes causes notable injury; differing thus from the general habits of the family. It succumbs readily in all stages to even weak mixtures of the arsenites.

CHILOCORUS Leach.

- C. bivulnerus Muls. Throughout the State: is a scale feeder and the most effective enemy of the San José or pernicious scale in New Jersey. This species is also the chief agent in keeping down this same scale in California, but in that State it breeds practically all season, thus securing an advantage over its prey that it does not possess in our own State, where it can mature two broods only.

AXION Muls.

- A. tripustulatum De G. Woodside (Bf), Atlantic City (Li), Da Costa on pines, IV and V (W), Riverton, VI, feeding on San José scale. Should this species increase sufficiently it would form a most effective scale check.

EXOCHOMUS Redt.

- E. marginipennis Lec. Da Costa (Li), g. d., rare (W).

DELPHASTUS Casey.

- D. pusillus Lec. (*Cryptognatha*.) Orange Mts. V, 5, 19, rare (Bf), Ft. Lee, Snake Hill (Sf), Buena Vista (Li).

BRACHYACANTHA Chev.

- B. ursina Fabr. Common throughout the State.
 B. 10-pustulata Mels. Throughout the State, less common.
 B. basalis Mels. "New Jersey" (Li).
 B. dentipes Fabr. Woodbury (Li), Anglesea (W).

HYPERASPIS Chev.

- H. bigeminata Rand. Atco (Li), Jamesburg, IV, 18.
 H. signata Oliv. Orange Mts. (Bf), Hudson Co. (Ll), g. d. (W), Rancocas, the larva feeding, VI, 28, on the tulip soft scale.
 H. proba Say. Throughout the State, locally not rare.
 H. binotata Say. = *Coccinella affinis* Rand. Atlantic County, rare (W), on pine trees in spring, on willows in summer.
 H. lewisii Cr. "New Jersey," one example only (W).
 H. fimbriolata Mels. Hudson Co. (Ll), Newark district g. d. (Bf), Spring Lake (Ch), South Jersey (W).
 H. undulata Say. Hudson County (Ll), Newark district (Bf), g. d., Westville, V, 27 (W).

SMILIA Weise = PENTILIA.



Fig. 89.—*Smilia misella*: *a*, adult; *b*, larva; *c*, pupa; *d*, all stages, larva and adult feeding on the pernicious scale in calyx cup of pear: all much enlarged.

S. misella Lec. Throughout the State, locally common on trees infested by the San José or pernicious scale: this insect has increased enormously since the pernicious scale has been introduced, but it is not yet equal to coping with its prey and forms a check merely.

STETHORUS Weise.

S. punctum Lec. Spring Lake (Ch), g. d. (Li).

SCYMNUS* Kug.

S. fraternus Lec. G. d. rare (Li).

S. brullei Muls. Clifton (Ch), Ft. Lee (Sf).

S. hemorrhous Lec. Orange Mts. (Bf), Cape May Court House (W).

S. chromopyga Casey. Pennsylvania, near Philadelphia (Casey).

S. cervicalis Muls. Spring Lake (Ch), Ft. Lee (Sf), "New Jersey" (Li).

S. caudalis Lec. Orange Mts. (Bf).

* The species are not satisfactorily determined in collections generally, and while I have compared many of my own and Mr. Bischoff's species with the Horn collection these have not been verified by Capt. Casey's tables.

- S. collaris* Mels. G. d. (Li), Anglesea, DaCosta (W), Ft. Lee (Sf).
S. indutus Casey. = *puncticollis* Horn. Greenwood Lake, VI, 21 (Lv).
S. puncticollis Lec. Probably occurs in New Jersey.
S. tenebrosus Muls. Spring Lake (Ch), New Jersey, g. d. (Li).
S. punctatus Say. Anglesea, VII (Sz), g. d. in Newark district (Bf), Ft. Lee, the black form (Sf), Buena Vista (Li).
S. nanus Lec. South Orange, VII, 4 (Lv), Ft. Lee (Sf).
S. americanus Muls. Atco (Li), Orange Mts. (Bf), DaCosta, Cape May Court House (W), Ft. Lee (Sf).
S. flavifrons Mels. var *bioculatus* Muls. Anglesea V, 30 (W), Atco (Li), Orange Mts., V, 5 (Bf), Ft. Lee (Sf).
S. intrusus Horn. Newark, VIII, 30, rare (Bf).
S. liebecki Horn. South Jersey (Horn), Buena Vista (Li).
S. terminatus Say. Newark district, III, V (Bf), Ft. Lee (Sf), g. d. (W).
S. xanthaspis Muls. Newark district, III, 7, VII, 26 (Bf).
S. paludicola Sz. Lake Hopatcong (Pm).

CEPHALOSCYMNUS Crotch.

- C. zimmermanni* Crotch. Orange Mts., Woodside, rare (Bf), Anglesea, VII (W).

COCCIDULA Kug.

- C. lepida* Lec. Gloucester and Camden Counties, locally common in winter, collecting in swamps near Westville and Merchantville (W), Atco (Li).

Family ENDOMYCHIDÆ.

Somewhat resemble the "lady-birds" but are, as a rule, longer and with somewhat more contrasting, shining surfaces. They are almost exclusively fungus feeders in both larval and adult stages, hence not of importance from an economic standpoint.

MYCETÆA Steph.

- M. hirta* Marsh. Orange Mts. (Bf), Staten Island, III, in decaying fungus covered stumps (Ds), Ft. Lee (Joutel).

RHANIS Lec.

- R. unicolor* Ziegl. Camden, Gloucester Co. (W), g. d. (Li), Newark district (Bf), Madison (Pr), under old bark.

PHYMAPHORA Newn.

- P. pulchella* Newn. Madison (Pr), Caldwell (Cr), Newark (Soc).

LYCOPERDINA Latr.

- L. ferruginea* Lec. Camden, Gloucester Co., in puff balls (W), Newark district g. d. (Bf), Hudson Co. (Li), Ft. Lee, under bark on fungus (Bt), Greenwood Lake, bred from fungus in May (Lv).

APHORISTA Gorh.

- A. vittata* Fabr. Gloucester (Li), g. d. (W), Spring Lake (Ch), Woodside, Newark (Bf), Caldwell (Cr), Madison, Lakewood, on mould in logs.

MYCETINA Muls.

- M. perpulchra* Newm. Newark, Orange Mts., Palisades (Bf).
M. testacea Ziegl. Seashore, rare (Li), Da Costa, two examples (W), Milburn, rare (Bf).

STENOTARSUS Perty.

- S. hispidus* Hbst. Atlantic, Cape May Co., on pine, IV and V, Da Costa (W), Atlantic City, Landisville (Li), Newark, on dead branches (Soc).

EPIPOCUS Germ.

- E. bivittatus* Gerst. Newark, rare (Bf).

ENDOMYCHUS Panz.

- E. biguttatus* Say. Hopatcong (Pm), Ft. Lee, under bark on fungus (Bt), Madison, IX, 5 (Pr), Palisades, VI, 28 (Lv), Hudson Co. (Li), Newark district (Bf), g. d. (W, Li).

Family EROTYLIDÆ.

Beetles of varying shape, usually yellow or brown with black or blue in contrast. One type is long, very slender and somewhat cylindrical, and this lives in the larval stage in the stalks of living plants such as clover; the others are shorter, more robust, tapering to the end of the wing-covers, and these are feeders in fungus or under the bark of trees. The clover-stem borer is the only important species and this is best treated by cutting before the transformations have been completed.

LANGURIA Latr.

- L. bicolor* Fabr. Brigantine beach, IX (Hn), seashore, Westville (Li), Camden (W), Newark (Soc).
L. mozardi Lec. Throughout the State: larva is the "clover stem borer," and feeds by preference in stems of *Compositæ* (Ch).

- L. discoidea* Lec. "New Jersey," probably Chester (Dkn).
L. tædata Lec. Hopatcong (Pm), Hudson Co. (Ll), seashore (W, Li), Anglesea, VI, 10.
L. angustata Beauv. Hopatcong (Pm), Madison (Pr), Snake Hill, IV, 26 (Lv), Hudson Co. (Ll), Newark district (Bf), g. d. (W).
 var. *trifasciata* Say. Salt meadows, early spring, under stones (Bf), g. d., in wet places, taken in sweep net (W).
L. gracilis Newm. Madison, VII, 3 (Pr), Hudson Co. (Ll), Gloucester (Li), g. d. (W); lives in stems of *Compositæ* (Ch).

DACNE Latr.

- D. 4-maculata* Say. "New Jersey" (Li); on white fungi growing on old logs (Ch).

MEGALODACNE Cr.

- M. fasciata* Fabr. Throughout the State under old bark infested with fungi.

ISCHYRUS Lac.

- I. 4-punctatus* Oliv. Caldwell (Cr).

MYCOTRETUS Lac.

- M. sanguinipennis* Say. Staten Island (Lg), Plainfield (Sf).
M. pulchra Say. Woodside, taken once, plentifully (Bf), Hudson Co. (Ll).

TRITOMA Fabr.

- T. humeralis* Fabr. Throughout the State, VIII, IX, on mushrooms and other fungi.
T. biguttata Say. Also throughout the State, VII to IX, like all the species on fungi.
T. angulata Say. Woodside, Orange Mts., rare (Bf), Hudson Co. (Ll), "New Jersey" (Horn).
T. unicolor Say. Throughout the State, common in fungi.
T. thoracica Say. Throughout the State, V to IX, not common.
T. flavicollis Lec. Common throughout the State, V to IX; reported by all collectors.

Family COLYDIIDÆ.

Usually brown in color, slender or somewhat flattened, usually with ridged wing-covers. Live largely on dead or dying trees, some of them being known to devour the larvæ of wood-boring beetles. On the whole of little economic importance.

SYNCHITA Hellw.

- S. obscura* Horn. Orange Mts. (Bf), Anglesea, VII (Sz); exclusively on red oak (U).
S. fuliginosa Mels. Hudson Co. (Ll), Orange Mts. (Bf), under bark of dead branches (U).

CICONES Curt.

- C. marginalis* Mels. Newark, at lights (Bf).

DITOMA Ill.

- D. quadriguttata* Say. Hudson Co. (Ll), Newark, Orange Mts., rare (Bf), DaCosta, rare (Li), Lakewood; under bark generally.

COXELUS Latr.

- C. guttulatus* Lec. Ft. Lee, under bark, in fungus, early in Spring (Bt), Westville, rare (Li); found also on dead branches.

AULONIUM Er.

- A. parallelopipedum* Say. Hudson Co. (Ll); under bark and in twigs of coniferous and deciduous trees.
A. tuberculatum Lec. Newark, rare (Bf).

COLYDIUM Fabr.

- C. lineola* Say. Ft. Lee, under bark in early spring (Bt), Hudson Co. (Ll), Camden, Gloucester Co. (W).

OXYLÆMUS Er.

- O. americanus* Er. Ft. Lee (Joutel).

PENTHELISPA Pasc.

- P. hæmatodes* Fabr. Anglesea (W); under moist bark of dead pines.

PYCNOMERUS Er.

- P. sulcicollis* Lec. Woodside, IV, 3, rare (Bf).

BOTHRIDERES Er.

- B. geminatus* Say. Ft. Lee (Sf), g. d. (Li), under dry oak bark (U).

CERYLON Latr.

- C. castaneum* Say. Hudson Co. (Ll), salt meadows, g. d. (Bf), g. d., rare (W), Lakewood.

PHILOTHERMUS Aubé.

P. glabriculus Lec. Hopatcong (Pm), Hudson Co. (Ll), g. d. (Li, W) : in decayed wood.

Family RHYSSODIDÆ.

CLINIDIUM Kirby.

C. sculptile Newm. Camden, Gloucester Co. (W), g. d. (Li), New Brunswick, Lahaway : probably elsewhere if sought for. Found under bark and of no economic importance. The species is long, slender, brown in color and with ridged prothorax.

Family CUCUJIDÆ.

Small or moderate sized beetles, flat, narrow, fitted to live under bark, where most of them are found. They are said to be carnivorous in habit, but some of the species of *Silvanus* at least, are found in granaries and among stored products of various kinds. None of them attack living plants, and cleanliness, assisted by carbon di-sulphide, intelligently applied, will usually prevent loss on the dried stock.

SILVANUS Latr.

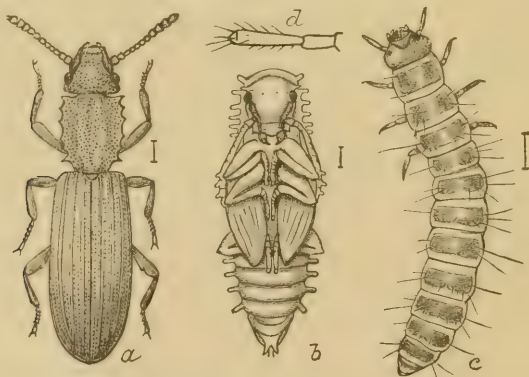


Fig. 90.—*Silvanus surinamensis*; a, adult; b, pupa; c, larva : enlarged.

S. surinamensis Linn. Throughout the State in stored grain, dried fruits, &c., common in mangers in stables.

- S. bidentatus* Fabr. Madison (Pr), Hudson Co., (Ll), Newark district (Bf), g. d. (W); under bark and not rare.
- S. planatus* Germ. Hudson Co. (Ll), Newark, g. d. (Bf), Orange, under pine bark (Ch), Brigantine, IX (Hn).
- S. imbellis* Lec. G. d., not rare (Li), Anglesea.

CATHARTUS Reich.

- C. advena* Waltl. Throughout the State, rare under bark (Sm), more common in stored grain, fruit, nuts, &c., particularly such as are spoiled.

NAUSIBIUS Redt.

- N. dentatus* Marsh. Fort Lee (Joutel), Newark (Bf), g. d. (Li), under bark, also occasionally in store houses (Ch).

CATOGENUS Westw.

- C. rufus* Fabr. Throughout the State under bark of various trees; but local and sometimes rare.

PEDIACUS Shuck.

- P. depressus* Hbst. Newark, rare (Bf).

CUCUJUS Fabr.

- C. clavipes* Fabr. Throughout the State, under bark, predatory in the larval stage.

LÆMOPHLÆUS Lap.

- L. biguttatus* Say. Throughout the State, under bark.
- L. fasciatus* Mels. Newark, rare (Bf), Anglesea, VII (Sz).
- L. modestus* Say. Westville, I, 28, sifting (W), Jamesburg, V, 10, in oak bark.
- L. convexulus* Lec. Hudson Co. (Ll), Newark (Bf).
- L. adustus* Lec. Hudson Co. (Ll), Newark (Bf), Jamesburg, V, 10.
- L. testaceus* Lec. Hudson Co. (Ll), Newark (Bf).
- L. alternans* Er. Cosmopolitan (Casey).
- L. ferrugineus* Steph. Cosmopolitan (Casey); it is probable that all these species will be found in all parts of the State when thorough collections are made. In this group I have practically no records from South Jersey.

LATHROPUS Er.

- L. ventralis* Lec. Hudson Co. (Ll), Anglesea, VII (Sz), g. d., rare (W).

BRONTES Fabr.

B. dubius Fabr. Reported from all parts of the State.

B. debilis Lec. Hudson Co. (Ll): it is not improbable that some of my records for *dubius* should really refer to this species. Capt. Casey separates the two and states that the former is southern, while *debilis* is the common northern species.

TELEPHANUS Er.

T. velox Hald. Throughout the State under stones and old leaves sifted out, I, 28, by Mr. Wenzel from old leaves, &c., gathered at Westville.

Family CRYPTOPHAGIDÆ.

Small clavicorn beetles living in fungi and decomposing vegetable matter : of no economic importance. Yellow to blackish in color, flattened beneath, not very convex above, sometimes banded.

The species are not commonly collected and yet less known : several species of *Atomaria* and *Cryptophagus* will undoubtedly be added.

TELMATOPHILUS Heer.

T. americanus Lec. Hopatcong (Pm), Ft. Lee (Sf), Hudson Co. (Ll), Orange Mts. (Bf), taken by sweeping in humid meadows.

LOBERUS Lec.

L. impressus Lec. Hopatcong (Pm), Ft. Lee (Sf), Hudson Co. (Ll), Arlington meadows (Bf), Anglesea, VII, 23.

TOMARUS Lec.

T. pulchellus Lec. Hopatcong (Pm), Hudson Co. (Ll), salt meadows, not rare (Bf), Anglesea, VII (Sz), Lahaway, V, 28 : under old leaves, chips, &c., (U).

ANTHEROPHAGUS Latr.

A. ochraceus Mels Bloomfield, Orange Mts. (Bf), Hudson Co. (Ll), Westville, rare (Li); occurs on flowers and is inquilinous in nests of *Bombus*.

CRYPTOPHAGUS Hbst.

C. cellaris Scop. Spring Lake in cellars (Ch).

C. croceus Zimm. Newark, rare (Bf).

C. 4-dentatus Mükl. New Brunswick.

ATOMARIA Steph.

- A. vespertina* Mäkl. Snake Hill (Sf).
A. lætula Lec. Ft. Lee, Snake Hill (Sf).
A. ochracea Zimm. Snake Hill (Sf).
A. ephippiata Zimm. Hopatcong (Pm), Hudson Co. (Ll), Newark district (Soc), Camden (Li), Ocean Co., V.
-

Family MYCETOPHAGIDÆ.

Oblong or oval beetles of small or moderate size, brown or black, with obscure yellow mottlings or markings, more or less coated with silky hair. They are found under bark and in fungous growth, neither beneficial nor harmful to the agriculturist.

MYCETOPHAGUS Hellw.

- M. punctatus* Say. Palisades, VII, 26 (Lv), Ft. Lee, in fungus on oak (Bt), Woodside, g. d. (Bf), Hudson Co. (Ll), g. d. rather common (Li).
M. flexuosus Say. With the preceding, and similar in habit.
M. bipustulatus Mels. Eagle Rock, 1 specimen (Bf): sometimes found in old flour barrels.
M. pluriguttatus Lec. Newark district, in fungus (Bf).
M. melsheimeri Lec. Camden, rare (Li).
M. pluripunctatus Lec. Greenwood Lake (Sf), Westville (Li).
M. pini Ziegl. Westville, rare (Li); under pine bark.
M. obsoletus Mels. Avalon, one specimen (Li).

LITARGUS Er.

- L. 6-punctatus* Say. Orange Mts., Newark, IX, 20 (Bf), Hudson Co. (Ll), Anglesea, VII (Sz); under decomposing vegetable matter and bark.
L. balteatus Lec. Staten Island, VI (Lg).
L. tetraspilotus Lec. Orange Mts., Newark, V, 30 (Bf).
L. didesmus Say. Hudson Co. (Ll), Anglesea, VII (Sz).

TYPHÆA Steph.

- T. fumata* Linn. Common everywhere in stables and in sweepings from granaries and feed stores (Ch), bred in numbers from dry rotting potatoes, New Brunswick.

Family DERMESTIDÆ.

Oblong, stout, or short and chunky, heavily built beetles with short weak legs, that may be very closely folded to the body. Covered with flattened hair or scales, usually black and white mottled ; but sometimes with red, brown and yellow scales. The larvæ are elongate hairy creatures with tufts of bristles at the tip of the abdomen, or bunches of hair that may be erected or spread out. They feed in all stages on stored animal and vegetable products and include the "larder beetles," "leather beetles," "museum beetles" and "carpet beetles." They are, therefore, decidedly injurious, though they do not attack growing vegetation (except *Byturus*). Protection is gained by preventive measures, either in making access impossible to the beetles or by using repellants like camphor or naphthaline.

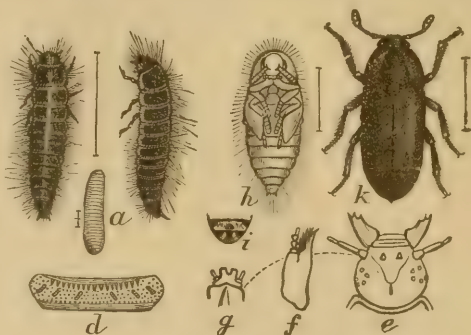


Fig. 91.—The leather beetle, *Dermestes vulpinus*: *a*, larva from above and side; *h*, pupa; *k*, adult; enlarged: the other figures refer to structural details of larva.

BYTURUS Latr.

B. unicolor Say. Hudson Co. (Ll), Newark, Milburn, VI, 12 (Bf), g. d. (Li), Staten Island; adult in flowers, larvæ in fruit of raspberries chiefly, a whitish maggot. It is the exception to the family rule in habit and appearance.

DERMESTES Linn.

- D. caninus* Germ. Throughout the State, V, VII, IX; under carcasses, sometimes rather common.
- D. lardarius* Linn. The "larder beetle," common throughout the State, often in houses on stored provisions. Remedial measures are to kill the larvæ and beetles when seen, screen the food and, where they are bad, leave some out as a trap.
- D. vulpinus* Fabr. Throughout the State, under old bones and dried carcasses; also in skins and leather, sometimes damaging the manufactured product: bisulphide of carbon and gasoline should be used so far as possible.
- D. frischii* Kug. Seashore, not rare (Li); Brigantine beach, IX, abundant (Hn).

ATTAGENUS Latr.

A. piceus Oliv. Throughout the State, common: the black carpet beetle. "In addition to the injuries it causes to carpets and woolens, it attacks

also cereals and other seeds" (Ch). Naphthaline may be used to prevent attack on stored woollens, while carbon bisulphide will clear them out of seeds.

TROGODERMA Latr.

T. ornatum Say. Caldwell (Cr), Orange Mts., on flowers, VI, 9 (Bf).

T. tarsale Mels. Throughout the State. "Sometimes injurious to cereal and other seeds, cayenne pepper, and very troublesome in collections of insects and other objects of natural history" (Ch). Remedies as for *Attagenus* and *Anthrenus*.

ANTHRENUS Geoffr.

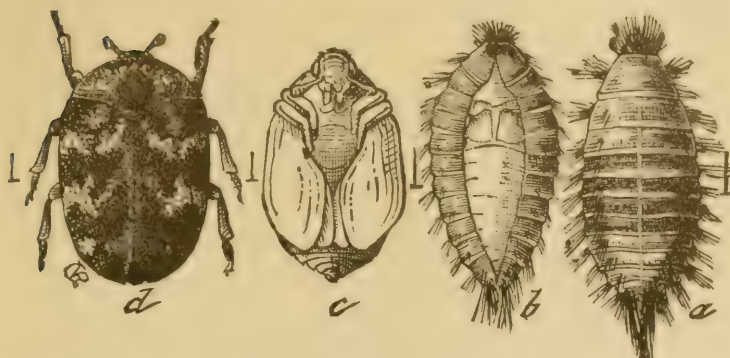


Fig. 92.—The carpet beetle, *Anthrenus scrophulariæ*: *a*, larva; *b*, pupa formed in larval skin; *c*, pupa; *d*, adult: all much enlarged.

A. scrophulariæ Linn. The "Carpet beetle," known in the larval stage as the "Buffalo Moth," because of the erectile tufts of hair that somewhat resemble a mane. Adults common on flowers; larvæ infest chiefly woollens. From stored clothing they can be kept with naphthaline: carpets should be removed and cleaned, if possible, and the floors thoroughly scrubbed. If not possible, press the infested areas with a very hot flat-iron over a wet cloth, so as to drive a steam through the texture; or drench with gasoline, which will not injure fabric or good colors.

A. verbasci Linn.=*varius* Fabr. The common museum pest, injuring dried animal and vegetable products of all kinds. In collections naphthaline serves as a repellent.

A. musæorum Linn. Less common than the preceding and not injurious in this country.

CRYPTORHOPALUM Guer.

C. ruficorne Lec. Common on flowers in Ocean County.

C. triste Lec. Brigantine, mainland, IX, on solidago (Hu), also on many other flowers (Ch), Lahaway, VI, 1, XI, 5, Anglesea, V, 28.

ORPHILUS Er.

O. glabratus Fabr. Not uncommon on flowers.

Family HISTERIDÆ.

This family of beetles is recognizable by the short chunky form, shining black color, the elytra squarely cut off behind, leaving the end of the abdomen exposed, somewhat flattened above. The legs are short, the tibiæ broad and flat, fitted for digging. Antennæ are short, with a rounded club, or capitate. They are found in or under excrement and in decaying animal and vegetable



Fig. 92.—*Hister arcuatus* and *H. bimaculatus* : much enlarged.

matter of all kinds. A few are flattened and more oblong and these live under bark. The larvæ feed as a rule in the substances among which the adults are found. As a whole the beetles are scavengers, therefore beneficial rather than otherwise ; yet not of any great importance to the agriculturist.

HOLELEPTA Payk.

H. lucida Lec. Hudson Co. (Ll), Ft. Lee, under bark of chestnut (Bt) ; also under freshly loosened bark of other trees, the species of this genus being very flat.

H. fossularis Say. Throughout the State, under bark or in bark layers.

HISTER Linn.

H. planipes Lec. Ft. Lee, IV, under stones with ants (Bt), Woodside, IV, 3, in ants' nests (Bf), Newark (Dkn).

H. arcuatus Say. Along shore, more or less common ; also Madison (Pr), Newark (Bf).

H. biplagiatus Lec. West Bergen, V, 31 (Bf), Westville (Li), Brigantine beach, IX (Hn), g. d. (W), Anglesea, VII.

H. harrisii Kirby. Ft. Lee (Bt).

H. merdarius Hoffm. Hopatcong (Pm), New Brunswick, Anglesea.

H. interruptus Beauv. Ft. Lee (Bt), Hudson Co. (Ll), Newark district (Bf), Spring Lake (Ch), g. d. (W, Li), Union Co., IV : one of our common species.

- H. immunis* Er. Ft. Lee (Bt), Staten Island (Lg).
H. marginicollis Lec. Madison (Pr).
H. feodatus Lec. Hopatcong (Pm).
H. abbreviatus Fabr. Common throughout the State in cow-droppings.
H. civilis Lec. Camden, Gloucester Co. (W), seashore (Li), Brigantine beach, IX (Hn); not so common.
H. furtivus Lec. Madison (Pr).
H. depurator Say. Ft. Lee (Bt), Hudson Co. (Ll), Newark district (Bf); common in its range.
H. bimaculatus Linn. Madison (Pr), Waverly, West Bergen, V, 31, IX, 8 (Bf), Sandy Hook, VII (Bt), Caldwell (Cr), Atlantic Co. (W), seashore (Li).
H. sedecimstriatus Say. Caldwell (Cr), Hudson Co. (Ll).
H. americanus Payk. Ft. Lee (Bt), Newark district, V, 8 (Bf), Hudson Co. (Ll), g. d. (W, Li), South Jersey, V, 30.
H. perplexus Lec. Newark, III, 30, g. d. (Bf).
H. exaratus Lec. Brigantine beach, IX, rare (Hn).
H. subrotundatus Say. Throughout the State, locally not rare; occurs under bark and stones.
H. vernus Say. Orange Mts., V, 8, Newark, IX, 8 (Bf), g. d. (W).

‡ *Platysoma* Er.

- H. carolinus* Payk. Occurs throughout the State, under bark, as do the other species of this series.
H. lecontei Latr. With the preceding and much more common.
H. aurelianus Horn. Newark (Bf).
H. parallelus Say. Madison (Pr), Orange Mts., feeding on sap (Bf); not rare under bark (W).
H. coarctatus Lec. Staten Island (Lg), Lakewood (Ll).
H. cylindricus Payk. Lakewood (Bt, Ll).
H. attenuatus Lec. Under bark, rather rare (W).

EPIERUS Er.

- E. pulicarius* Er. Camden, Gloucester Co., under bark (W), lives also in decaying wood.

HETÆRIUS Er.

- H. brunneipennis* Rand. Hopatcong (Pm), Alpine, III, in ants' nests (Bt), Orange Mts., common in ants' nests (Bf).

ONTHOPHILUS Leach.

- O. alternatus* Say. Staten Island (Lg).

DENDROPHILUS Leach.

D. punctulatus Say. Newark, spring, in rotten elm ; rare (Bf).

PAROMALUS Er.

P. æqualis Say. Snake Hill (Ll), Newark district (Bf), g. d. (W), Anglesea ; occurs under bark, as do most of the other species of the genus.

P. estriatus Lec. Snake Hill (Ll).

P. conjunctus Say. Snake Hill, V, 22, Arlington, Woodside, under stones (Bf).

P. geminatus Lec. Brigantine beach, IX, rare (Hn).

P. 14-striatus Steph. Newark, g. d. (Bf), Snake Hill (Ll), Brigantine beach, IX (Hn) ; common locally.

P. bistriatus Er. Hopatcong (Pm), Ft. Lee (Bt), Newark, g. d., common (Bf), Snake Hill (Ll).

P. seminulum Er. Snake Hill, under bark of freshly cut stumps, where the sap is still flowing ; and this is true of the other species taken (Ll).

SAPRINUS Er.

S. pennsylvanicus Payk. All along the seashore, along sandy river banks, all summer common under carrion and in dung ; easily recognized by the polished deep blue or green color.

S. assimilis Payk. Throughout the State, usually in excrement, often common.

S. conformis Lec. Newark district, not rare (Bf).

S. placidus Er. Highlands (Ch), Sandy Hook, VII.

S. sphæroides Lec. Brigantine beach, IX, rare (Hn).

S. fraternus Say. Throughout the State, our most common species at all points inland.

S. patruelis Lec. Sandy Hook (Bt), Brigantine beach, IX (Hn), Cape May, VII (Sz).

S. dimidiatipennis Lec. Highlands, not rare (Ch), Sandy Hook, VI, VII (Bt), Seashore (W, Li) : all the species in this genus are much more common on or confined to the shore, where they burrow in the loose sand beneath dead fish and other animal matter.

PLEGADERUS Er.

P. transversus Say. Atlantic City (Castle), g. d. (W) ; found in galleries of *Tomicus* under pine bark.

P. barbelini Mars. Newark (Bf) ; but seems smaller than usual.

BACANIUS Lec.

B. misellus Lec. Lahaway, V, 28, on cranberry bogs.

ÆLETES Horn.

- Æ. politus* Lec. Hopatcong (Pm), Ft. Lee (Bt), Lahaway, V, 28, on cranberry bogs; lives under decaying leaves, weeds and other vegetable matter.

Family NITIDULIDÆ.

More or less flattened beetles as a rule, though there are some exceptions; with short clavate antennæ, short legs, and abbreviated elytra. In general shape they are oblong, often almost as broad as long, sometimes with very thin margins. Some species resemble rove-beetles in appearance and most of them have the tip of the abdomen more or less exposed. A fair proportion, however, have the elytra complete and many of these are feeders on dead animal matter. In a general way the members of the family are called sap beetles, but many live in fungi or dry animal and vegetable matter, or under bark of trees. "Sap beetles" are most abundant in September and October on tree-stumps cut in the spring of the same year, according to Mr. Linell, and Mr. Wenzel finds them at the same season in decaying fruit.

The species can scarcely be said to be injurious and may be generally classed as scavengers.

BRACHYPTERUS Er.

- B. urticæ* Fabr. Hopatcong (Pm), g. d. (W), Hoboken; commonly occurs on nettle (Ch).

CERCUS Latr.

- C. abdominalis* Er. Hopatcong (Pm), Orange Mts., not rare on pussy willows (Bf), Hudson Co. (Ll), Westville (Li), Anglesea (W), Jamesburg; occurs also on flowers of *Sambucus*, etc.

CARPOPHILUS Steph.

- C. hemipterus* Linn. An introduced species, found in grocers' and bakers' stock, common in Jersey City, Newark and New Brunswick.
- C. dimidiatus* Fabr. Staten Island (Lg).
- C. niger* Say. Hudson Co. (Ll), Orange Mts. (Bf), g. d. (W); all these under bark, in blossoms or on sap.
- C. corticinus* Er. Orange Mts. (Bf), Camden (Li).
- C. brachypterus* Say. Hudson Co. (Ll), Orange Mts. (Bf).
- C. antiquus* Mels. Hudson Co. (Ll).

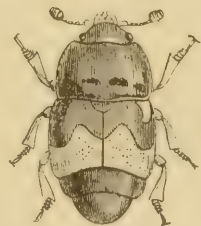


Fig. 94.—*Carpophilus hemipterus*: enlarged.

All the above, save *dimidiatus*, have been taken by myself on the wooded slopes of the Palisades.

COLASTUS Er.

- C. morio* Er. Bloomfield, under bark (Bf) ; all the species on exuding sap of trees or under bark.
- C. maculatus* Er. Ft. Lee (Sf), Hudson Co. (Ll).
- C. semitectus* Say. Orange Mts. (Bf), Hudson Co. (Ll), g. d. (W).
- C. unicolor* Say. Newark (Bf), Westville (W).
- C. truncatus* Rand. Orange Mts (Bf), Westville (W), Newark.

CONOTELUS Er.

- C. obscurus* Er. Hudson Co. (Ll), Orange Mts. (Bf), Brigantine beach, IX (Hn), g. d. (Li) ; in flowers of *Convolvulus*, &c. (W. Ch).

EPURÆA Er.

- E. helvola* Er. Hudson Co. (Ll), Brigantine, mainland, IX (Hn), Anglesea, VII (Sz), g. d. (W).
- E. rufa* Say. Madison (Pr), Hudson Co. (Ll), Newark, g. d. (Bf), Orange, Spring Lake, in fungi (Ch), Westville, 1, 28, sifting (W), Staten Island.
- E. erichsonii* Reitt. Lahaway, VI, 12.
- E. corticina* Er. Orange Mts., rare (Bf).
- E. avara* Rand. Hudson Co. (Ll), Lahaway, VI, 7, 23.
- E. ovata* Horn. Staten Island (Lg), Newark (Bf).
- E. peltoides* Horn. Hudson Co. (Ll), Orange Mts., V, 5 (Bf) ; on sap.
- E. labilis* Er. Hudson Co. (Ll), Orange Mts. (Bf).
- E. luteola* Er. Hopatcong (Pm).

NITIDULA Fabr.

- N. bipustulata* Linn. Ft. Lee, one spec. (Sf), West Bergen, IV, 24, common in dead fishes (Bf).
- N. rufipes* Linn. Hopatcong (Pm), Madison (Pr), Hudson Co. (Ll), West Bergen (Bf), Brigantine beach, IX (Hn), Camden (Li), Lahaway ; under dry animal matter.
- N. ziczac* Say. Common throughout the State.

STELIDOTA Er.

- S. geminata* Say. Throughout the State, on sap and under dry leaves.
- S. 8-maculata* Say. Hudson Co. (Ll), Newark, g. d. (Bf), Spring Lake (Ch), Anglesea, VII (Sz).
- S. strigosa* Gyll. Brigantine, mainland, IX (Hn).

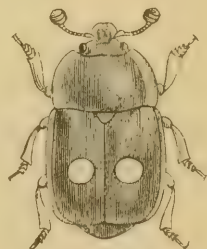


Fig. 95.—*Nitidula bipustulata* : enlarged.

PROMETOPIA Er.

- P. 6-maculata* Say. Madison (Pr), Caldwell (Cr), Ft. Lee, on sap (Bt); Newark, g. d. under bark (Bf), Orange, Highlands (Ch), Hudson Co. (Ll), g. d. (W, L).

PHENOLIA Er.

- P. grossa* Fabr. Ft. Lee, VIII, in mushrooms (Bt), Hudson Co. (Ll), Orange Mts., g. d. (Bf), g. d. (W, Li); common in gilled fungi generally.

OMOSITA Er.

- O. colon* Linn. Throughout the State, on dry carrion or in fungi.
O. discoidea Fabr. Lake Hopatcong (Pm).

SORONIA Er.

- S. guttulata* Lec. Hudson Co. (Ll).
S. undulata Say. Ft. Lee (Bt), Hudson Co. (Ll), g. d. (W, Li), Orange, Highlands (Ch), Newark.
S. ulkei Lec. Newark, one spec. (Bf), seashore (Li).

POCADIUS Er.

- P. helvolus* Er. Ft. Lee in *Lycoperdium* (Bt), g. d. (W).
P. infuscatus Reitt. "New Jersey" (Horn coll).

OXYCNEMUS Er.

- O. histrina* Lec. Ft. Lee (Bt), Hudson Co. (Ll), sea-shore (Li), g. d. (W); peculiar to the genus *Phallus* Sz.
O. nigripennis Lec. Sea Isle City, VIII (W).

AMPHICROSSUS Er.

- A. ciliatus* Oliv. Hudson Co. (Ll), Orange Mts., West Bergen, sap eaters (Bf), g. d. (W).

PALLODES Er.

- P. pallidus* Beauv.=*silaceus* Er. Madison (Pr), Ft. Lee (Bt), Newark, g. d., on toad stools (Bf), Hudson Co. (Ll), Highlands, in fungi (Ch), Anglesea, VII (Sz), g. d. (W).

CYLLODES Er.

- C. biplagiatus* Lec. Ft. Lee (Sf).

CYCHRAMUS Kug.

- C. adustus* Er. Orange Mts., in fungus (Bf), Hoboken; always rare.

CYBOCEPHALUS Er.

C. nigritulus Lec. Snake Hill (Sf); the allied species in California seems to feed in the San José or pernicious scale, but no such habit has thus far presented itself to view in our own species.

CRYPTARCHA Shuck.

C. ampla Er. Ft. Lee (Bt, Sf), Newark, g. d. (Bf), Hudson Co. (Ll), g. d. (W), Orange, feeds on sap of trees.

C. strigata Fabr. Hudson Co. (Ll), Ft. Lee (Sf), Orange (Ch), g. d., on sap at all times (W).

C. concinna Mels. Hudson Co. (Ll), Ft. Lee (Sf), g. d., not rare (Bf), Lahaway, II, 8.

IPS Fabr.

I. obtusus Say. Ft. Lee, on sap (Bt), Snake Hill (Ll), Orange Mts., Newark, Union (Bf), Westville (Li); all report it rare; a sap feeder with all others of this genus.

I. fasciatus Oliv. Throughout the State, common.

I. sanguinolentus Oliv. Throughout the State, though somewhat local and rarely common.

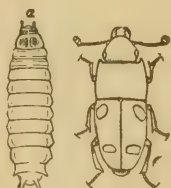


Fig. 96.—*Ips fasciatus* and larva: enlarged.

RHIZOPHAGUS Hbst.

R. sculpturatus Mann. Orange Mts., salt meadows (Bf); all the species under bark on moulds.

R. cylindricus Lec. G. d. not rare (Li), Lahaway, VI, VII.

R. bipunctatus Say. Hudson Co. (Ll), Woodside, taken once, plentifully (Bf).

R. minutus Mann. Orange Mts., rare (Bf).

Family LATRIDIIDÆ.

Very small, oval convex insects, the thorax usually narrower than the elytra. They are generally brown in color, often striated, occasionally banded. They live commonly under bark, the larvæ are oval, soft, very hairy, and live in vegetable refuse, fungi, &c. Occasionally they are found in granaries, but are never troublesome.

STEPHOSTETHUS Lec.

S. liratus Lec. Local, g. d., not rare (W), under debris (U), Snake Hill, Ft. Lee (Sf), Newark, V, 26, New Brunswick.

LATRIDIUS Hbst.

L. opaculus Lec. Ft. Lee (Sf).

L. several undetermined species are in the collections.

CORTICARIA Marsh.

C. dentigera Lec. Spring Lake (Ch)

C. deleta Mann. Arlington, III, 19 (Bf), g. d., in dried products.

C. elongata Hum. Orange (Ch).

C. americana Mann. Hudson County (Ll).

C. longipennis Lec. Arlington, III, 19 (Bf), Newark, New Brunswick.

C. cavicollis Mann. Hudson County (Ll).

C. simplex Lec. Anglesea, VII (Sz).

C. picta Lec. Snake Hill (Sf).

C. ferruginosa Mots. Orange (Ch).

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Family TROGOSITIDÆ.

Usually oblong, flat species, the prothorax as wide as the thorax and often well separated from it. Generally they live under bark, but a few live in granaries, where they sometimes become rather numerous, though hardly injurious. The measures already noted for other granary pests are also available here. A few seem to be parasitic in the larval stage.

THYMALUS Duft.

T. fulgidus Er. Dover, VII, 10 (Pr), Hopatcong (Pm), Englewood on white birch fungus in spring (Bt), Hudson County (Ll), Newark district, g. d. (Bf), Ft. Lee (Sf). This species looks like a bronzed lady-bird and is altogether unlike the other species.

NEMOSOMA Latr.

N. parallelum Mels. Orange Mts., VII, on sumach (Bf), Hudson Co. (Ll), Anglesea, one specimen (Li) : parasitic on Scolytids (U).

ALINDRIA Er.

A. cylindrica Serv. Anglesea (W).

TROGOSITA Oliv.

T. virescens Fabr. Weehawken, South Amboy (Bt), g. d., rather common (W, Li) : under bark.

TENEBRIOIDES Pall.

T. mauritanica L. G. d. (W); cosmopolitan, common in granaries, warehouses, stores, etc (Ch). This is the so-called "cadelle."

T. corticalis Mels. Hudson County (Ll), Caldwell (Cr), g. d. (W, Li).

T. collaris Sturm. Anglesea (W), Staten Island (Lg).

T. marginata Beauv. Anglesea (W).

T. castanea Mels. Hudson Co. (Ll), Camden (Li), Anglesea and g. d. (W): the variety *laticollis*, Horn, is from Anglesea (W).

T. bimaculata Mels. Anglesea, rare (W), Orange (Ch), Hudson County (Ll), Ft. Lee (Sf).



Fig. 97.—The "Cadelle": a, larva; b, adult; c to j, structural details: all enlarged.

MONOTOMA Hbst.

M. producta Lec. Brigantine beach, IX (Hn), Anglesea, VII, a strictly maritime species (Sz), found almost all summer.

M. picipes Hbst. Hudson Co. (Ll); under decaying vegetation.

EUROPS Woll.

E. pallipennis Lec. Lake Hopatcong (Pm), Ft. Lee (Sf).

BACTRIDIIUM Lec.

B. ephippigerum Guer. Hudson County (Ll), Orange Mts. (Bf), Ft. Lee (Sf).

B. striolatum Reit. Hudson Co. (Ll), Orange Mts. (Bf).

B. cavicolle Horn. Hudson Co. (Ll), Ft. Lee (Sf), Orange Mts. (Bf), Hopatcong (Pm); parasitic on *Nyleborus dispar* and *tachygraphus* (Sz), and usually found under bark or in the Scolytid galleries.

Family DERODONTIDÆ.

Oblong, rather convex species, the thorax rounded and toothed at the edge, elytra yellowish, with obscure blackish markings. Very little is known of the insects and nothing of the larvæ.

DERODONTUS Lec.

D. maculatus Mels. Staten Island (Lg), Orange Mts. (Bf).

Family BYRRHIDÆ.

These are known as "pill beetles," are small in size, usually black, with a close silky iridescent pubescence which makes the species easily recognizable. The legs and antennæ are so arranged that they can be so closely folded to the body as to be practically invisible. They live at the roots of grasses or in water, and practically nothing is known of the early stages.

NOSODENDRON Latr.

N. unicolor Say. Atlantic City, two specimens (W), Snake Hill, Orange Mts., g. d., rare (Bf), Ft. Lee, lily pond (Bt): feeds on sap of trees.

CYTILUS Er.

C. sericeus Forst. Hudson Co. (Ll), Newark district, g. d. (Bf), Fort Lee (Bt).
C. trivittatus Mels. Madison, V, 12 (Pr), Greenwood Lake, V, 22 (Lv).

BYRRHUS Linn.

B. americanus Lec. Sea shore, not common (W, Li), Fort Lee, Greenwood Lake (Bt), Newark (Bf).

LIMNICHUS Latr.

L. punctatus Lec. Newark, rare (Bf), Burlington County.
L. ovatus Lec. Anglesea, II, 22 (W), Lahaway, V, 28, on cranberry bogs.

Family PARNIDÆ.

These are aquatic beetles, with long legs not fitted for swimming; they are usually gray or black, sometimes striped with yellow, and are found clinging to the under sides of stones or wood debris in streams or ponds. They are oblong in shape, convex, the division between thorax and body well marked. The larvæ are flattened and somewhat resemble crustaceans in appearance.

PSEPHENUS Hald.

P. lecontei Lec. Hemlock falls, not rare (Bf), Milburn, on stones in streams (Bt), Echo lake, on stones and lily pads (Ds), Lake Macopin, abundant, walking on large submerged stones (Lg).

DRYOPS Oliv.

D. lithophilus Germ. Clifton (Ll), Newark g. d. (Bf), Orange Mts., in streams (Bt), Palisades, VII, 26 (Lv), Lake Hopatcong (Pm), under stones in running water (U).

- D. fastigiatus* Say. Orange Mts., Newark district (Bf), Clifton (Ll), Hopatcong (Pm).
D. striatus Lec. Orange Mts. (Bf), "New Jersey," (Roberts).

ELMIS Latr.

- E. bivittatus* Lec. New Jersey (Lg): all the species under stones or sticks in running water (U).
E. 4-notatus Say. Clifton (Ll), Atco (W).
E. elegans Lec. Newark (Bf).
E. nitidulus Lec. Atco, under stones, in running water (W), Jamesburg, VII, 4 (Ly), Ft. Lee (Sf).
E. pusillus Lec. Clifton (Ll).

STENELMIS Dup.

- S. crenatus* Say. Clifton (Ll), Newark, at light (Bf), Lake Hopatcong (Pm).
S. bicarinatus Lec. Newark, at light (Bf).
S. 4-maculatus Horn. Newark (Bf).
S. vittipennis Zimm. Clifton (Ll).

MACHRONYCHUS Müll.

- M. glabratus* Say. Orange Mts., Jamesburg, VII, 4 (Bf), Lake Hopatcong (Pm), Clifton (Ll), g. d., under logs in running water (W).

ANCYRONYX Er.

- A. variegatus* Germ. Orange Mts., Jamesburg, VII, 4 (Bf), Clifton (Ll), g. d., under logs in running water (W).

Family HETEROCERIDÆ.

These beetles are oblong, convex, densely clothed with short silken pubescence. The thorax is almost square, the corners rounded, head small with the mandibles projecting prominently. They are yellowish in color mottled with blackish spots or bands, and live in galleries in sand or mud along the banks of ponds, streams or ditches. They fly at night and are often attracted to light. The larvæ are found with the beetles and are supposed to feed upon the decayed vegetation or microscopic organisms found there.

HETEROCERUS Fabr.

- H. tristis* Mann. Sea shore, rare (Ll).
H. fatuus Kies. Brigantine beach, IX (Hn).

- H. ventralis* Mels. Atlantic City (W).
H. auromicans Kies. Anglesea, V, 30 (W).
H. undatus Mels. Anglesea, V, 30 (W), Orange Mts. (Bf), Newark.
H. pusillus Say. Newark, Orange Mts. (Bf), Orange, quite abundant at light (Ch).
H. brunneus Mels. Newark, a single specimen (Bf).
-

Family DASYLLIDÆ.

Small, oval, convex species, with rather soft elytra, head concealed and bent down, antennæ usually slender but sometimes serrated toward the tip. The legs are slender and when disturbed the insects draw up so as to seem almost hunched; the broadest portion of the body coming a little before the middle. They are beaten from trees or swept from shrubs along water courses and some species are very common, though none are injurious.

EURYPOGON Mots.

- E. niger* Mels. Orange Mts., VI, 2 (Bf), Hudson County (Ll), Hopatcong (Pm), Greenwood Lake (Sf).

ODONTONYX Guer.

- O. trivittis* Germ. Orange Mts., one specimen (Bf); in swampy places (U).

PTILODACTYLA Latr.

- P. serricollis* Say. Hudson County (Ll), Newark, Orange Mts. (Bf), g. d., (W).

EUCINETUS Germ.

- E. terminalis* Lec. Hudson County (Ll), Newark (Bf); sifted from mouldy leaves (U).

ECTOPRIA Lec.

- E. nervosa* Mels. Hudson County (Ll), Orange Mts., Woodside, VI, 23 (Bf), Anglesea (W).

PRIONOCYPHON Redt.

- P. limbatus* Lec. Da Costa (W), Staten Island (Lg), eastern New Jersey (Dietz).

HELODES Latr.

- H. pulchella* Guer. Woodside, Orange Mts., not rare (Bf), Staten Island (Lg), Hopatcong (Pm), Lahaway, V, 28.
H. thoracica Guer. Orange Mts., Woodside (Bf), Hopatcong (Pm).

SCIRTES Ill.

S. orbiculatus Fab. Clementon, VIII, 6 (W), Hudson Co. (Li).

S. tibialis Guer. Madison, Budd's Lake, VII, 14 (Pr), Newark (Bf), Plainfield (Sf), g. d. (W).

CYPHON Payk.

C. robustus Lec. Anglesea, Merchantville, V, 23, in Magnolia swamps among *Sphagnum* (W), Atco, Buena Vista (Li).

C. obscurus Guer. Waverly, III, 5, Newark (Bf).

C. collaris Guer. Hudson County (Li), g. d. (Bf).

C. variabilis Thunb. Common throughout the State.

C. padi Linn. Anglesea (W).

PLACONYCHA Horn.

P. edwardsii Lec. Lake Hopatcong (Pm).

Family RHIPICERIDÆ.

Elongate, very convex black or brown species, somewhat resembling *Ela-teridæ* but without the power of leaping, the thorax shorter, head more prominent, with large calliper-like mandibles and flabellate antennæ in the males. They are very rare and usually found on or near dead cedars.

SANDALUS Knoch.

S. petrophya Knoch. Staten Island on beech (Lg), North Jersey (Li), Newark (Bf), Plainfield (Sf), Anglesea in wash up (W), always rare.

Family ELATERIDÆ.

The insects belonging to this family are commonly known as "click beetles," "snapping beetles" or "spring beetles," because of their power of springing into the air when placed on their back and turning right side up in the process. The prothorax is long, loosely jointed to the meso-thorax, prolonged backward on the under side into a curved process which fits into a groove or cavity in the meso-thorax. When the insect is placed on its back it elevates the body until



Fig. 98.—A click-beetle, or snapping beetle.

it rests on the head and tip of elytra, and the end of the spine rests at the edge of the cavity. The tension is then suddenly removed and the curvature reversed, the shoulders of the wing-covers striking the surface hard enough to elevate the beetle for quite a distance. In general the insects are at least three times as long as wide, broadest at the shoulders and tapering posteriorly. The prevailing colors are brown, black and yellowish, and the species are not often spotted or banded. In the adult stage they rarely do much feeding. The larvæ are long, slender, a little flattened, very tough and leathery in texture, whence they are termed "wire-worms." Some of these live in decaying wood and are practically harmless; but others live in the soil, feeding on the roots

of growing plants, chiefly grasses. Corn and potatoes following sod are mainly injured and, when the pests are abundant, very little can be done to check them. Ordinary insecticide applications are entirely useless. Systematic fall plowing of sod land is useful, because it destroys the pupæ and recently developed beetles. Heavy dressings of kainit are useful in spring to kill the smaller larvæ, and these methods, combined with short periods in sod, will serve to lessen if they do not entirely prevent the evil. The insects usually require three years from egg to adult, and a number of species are injurious in the same general manner.

MELASIS Oliv.

M. pectinicornis Mels. Palisades (Lv), Alpine (Bt), Ft. Lee (Sf), Newark (Soc), Atlantic City (Castle), Anglesea, VII, and South Jersey (W): found boring in dead oaks (U).

THAROPS Lap.

T. ruficornis Say. Madison, VI, 27 (Pr), Hudson County (Ll), Ft. Lee, South Orange (Sf), seashore (Li), Anglesea (W), always rare; bores in felled trees (U).

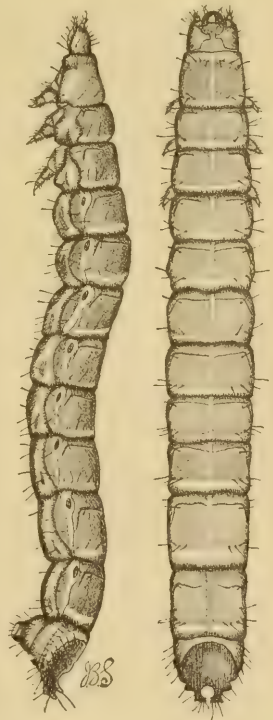


Fig. 99.—Wire worm from above and side: enlarged.

DELTOMETOPUS Bonv.

- D. amœnicornis* Say. Hudson County (Ll), Ft. Lee (Sf), Anglesea (W), V,
28 (Sm), g. d. (Li) : on dead branches (U).
D. rufipes Mels. Ft. Lee (Sf).

DROMÆOLUS Kies.

- D. cylindricollis* Say. New Jersey (Dkn).
D. striatus Lec. Fort Lee, on bull thistle, at the junction of leaf and stem,
hard to pick off (Bt), Buena Vista (Li).

FORNAX Lap.

- F. orchesides* Newn. Avalon (W).

ENTOMOPHTHALMUS Bonv.

- E. rufolus* Lec. Ft. Lee (Sf).

MICRORRHAGUS Esch.

- M. humeralis* Say. Staten Island (Lg) : all the species on dead branches.
M. subsinuatus Lec. Ft. Lee (Sf).
M. imperfectus Lec. Staten Island (Lg).
M. triangularis Say. Newark (Bf), Madison (Pr), Hopatcong (Pm), Fort
Lee (Bt).
M. bonvouloirii Horn. Fort Lee (Sf).

HYPOCÆLUS Esch.

- H. frontosus* Say. Ft. Lee (Joutel).

SCHIZOPHILUS Bonv.

- S. subrufus* Rand. South Jersey (Li), Plainfield (Sf).

SARPEDON Bonv.

- S. scabrosus* Bonv. Palisades, bred (Lv).

AGRYPNUS Esch.

- A. sallei* Lec. Anglesea, IX (W), at sugar, VII, 4, copulating (Lv).

ADELOCERA Latr.

- A. marmorata* Fabr. Gloucester, Camden County (W), Westville (Li).
A. discoidea Web. Chester (Dkn), Ft. Lee, spring and fall (Bt), g. d.
(W, Li).

A. aurorata Lec. Chester (Dkn), "New Jersey."

A. maculata Lec. "New Jersey," exact locality unknown (Li).

A. obtecta Say. South Amboy, X (Bt): all the species under dead bark (U).

CHALCOLEPIDIUS Esch.

C. viridipilis Say. Gloucester and Camden Counties (W), Westville (Li), rare.

ALAUUS Esch.

A. oculatus Linn. Occurs throughout the State not rarely; larva in decaying wood; under bark of oak and chestnut (Ch).

A. myops Fab. Del. Water Gap (Bt), g. d. (W, Li); throughout the pine districts, and more common southwardly: larva under pine bark.

HEMIRHIPUS Lec.

H. fascicularis Fabr. G. d., but rare (W).

CARDIOPHORUS Esch.

C. convexus Say. Hopatcong (Pm), Anglesea, VII, 4 (Lv), Atco, Da Costa, South Jersey (W).

C. cardisee Say. G. d. (W), Hopatcong (Pm), Highlands (Ch), Anglesea, V, 28.

C. convexulus Lec. Staten Island (Lg).

C. gagates Er. Madison (Pr), Atco, Da Costa (W), Lahaway, IV, 1, 10, Anglesea, V, 28, Burlington Co., Newark.

C. lævicollis Er. Long Island, and probably also New Jersey (Bt).

C. robustus Lec. "New Jersey" (Horn), Anglesea, V, 28.

HORISTONOTUS Cand.

H. curiatus Say. Ft. Lee (Bt), Hudson County (Ll), Westville (Li), Camden and Gloucester Counties (W), Jamesburg, VII, 4.

CRYPTOHYPNUS Esch.

C. abbreviatus Say. Orange (Lg), Snake Hill, IV (Sf), Newark district.

C. exiguus Rand. = *pulchellus* and *guttulatus*. Camden (Li), Westville (W, Li), Jamesburg, V, 10.

C. choris Say. South Camden, IV, 29, local (W), Gloucester Co. (Lg), Chester (Dkn).

C. obliquatulus Mels. Camden (Li), Ocean County, V, 28.

C. perplexus Horn. "New Jersey" (Lg).

C. delumbis Horn. Staten Island (Lg).

MONOCREPIDIUS Esch.

- M. lividus* De G. Hopatcong (Pm), Orange Mts., Ft. Lee, South Amboy, VII (Bt), Newark district (Bf), Hudson Co. (Ll), g. d. (W, Li), Burlington Co., VII, 25, Sandy Hook, VII, 15, Lahaway, VII, 21.
- M. vespertinus* Fabr. Weehawken (Bt), Caldwell (Cr), Hudson Co. (Ll), g. d. (W, Li), Sea Girt, IX (Ch), DaCosta, VII, 28, injurious to beans in 1897.
- M. auritus* Hbst. Throughout the State, common in June.
- M. bellus* Say. Throughout the State, not rare, June and July: breeds at roots of millet, *Panicum* sp. (Ch).

ELATER Linn.

- E. hepaticus* Mels. Camden, Gloucester Co. (W).
- E. pedalis* Germ. Hopatcong (Pm), Atco (Li), g. d. (W), Anglesea, Lahaway, VI, 1, 12, on flowers of Magnolia, common.
- E. mixtus* Hbst. Hopatcong (Pm), Ft. Lee, on flowers of Elder (Bt), Anglesea, (W), Lahaway, VI, 1, 24, on flowers, chiefly Magnolia.
- E. nigricollis* Hbst. Palisades, III, 7 (Lv), Ft. Lee (Bt), Newark district (Soc), Hudson County (Ll), g. d. (W, Li).
- E. linteus* Say. Hudson County (Ll), g. d. (W, Li).
- E. discoideus* Fabr. Palisades, bred from beech (Lv), Ft. Lee (Bt).
- E. sayi* Lec. Hopatcong (Pm), Ft. Lee under oak bark (Bt), Camden, Gloucester County, rare (W).
- E. socer* Lec. Lahaway, VI, 16.
- E. rubricollis* Hbst. Newark (Soc), Westville (Li), Camden, Gloucester Co. (W), Lahaway, VI, 1, 12, on flowers of Magnolia.
- E. militaris* Harr. Anglesea, rare (W).
- E. luctuosus* Lec. Staten Island (Lg), Ft. Lee (Bt).
- E. nigricans* Germ. Ft. Lee, V, on flowers (Bt), Hudson Co. (Ll).
- E. rubricus* Say. Ft. Lee, V, on flowers (Bt), Hudson Co. (Ll), Camden, South Jersey (W), Jamesburg, VI, Lahaway, VI, 1, 12, on flowers of Magnolia.
- E. collaris* Say. Camden rare (Li), Ft. Lee, V, on flowers (Bt), Hopatcong (Pm).
- E. sanguinipennis* Say. Hopatcong (Pm), South Amboy, VIII (Bt), Brigantine, mainland, IX (Hn), on ash (W).
- E. xanthomus* Germ. Da Costa (Li), Camden, Gloucester Co. (W).
- E. obliquus* Say. Ft. Lee (Bt), Hudson Co. (Ll), Newark (Soc), g. d. (W, Li), Ocean County.
- E. pusio* Germ. Anglesea, VII, 4 (Lv), Hudson Co. (Ll).

DRASTERIUS Esch.

- D. elegans* Fabr. Snake Hill, IV, 26 (Lv), Weehawken, IV, V (Bt), Hudson County (Ll), Newark (Soc), g. d. (W, Li), Atlantic County, VI, 24, VII, 15.
- D. amabilis* Lec. Weehawken, IV, V under stones (Bt), Hudson County (Ll), Camden (W, Li), Gloucester County (W), Sandy Hook, VII.

MEGAPENTHES Kies.

- M. limbalis* Hbst. Atco, Da Costa, Anglesea (W), g. d. (Li), Ft. Lee (Bt), Hudson County (Ll), Newark (Soc).
- M. rufilabris* Germ. Hudson Co. (Ll), Ft. Lee (Sf), Atco (Li), Anglesea (W).

LUDIUS Latr.

- L. attenuatus* Say. Chester (Dkn), Ft. Lee (Bt), Hudson Co. (Ll), Caldwell (Cr), Newark (Soc), Camden (Li), Lahaway, VII, 12.
- L. abruptus* Say. Hopatcong (Pm), Caldwell (Cr), Hudson Co. (Ll), Westville (Li).

ORTHOSTETHUS Lac.

- O. infuscatus* Germ. Avalon, rare (W).

AGRIOTES Esch.

- A. mancus* Say. Weehawken (Bt), Caldwell (Cr), Newark (Soc), Hudson Co. (Ll).
- A. stabilis* Lec. Madison (Pr).
- A. insanus* Cand. Hudson Co. (Ll).
- A. fucosus* Lec. Fort Lee (Bt).
- A. pubescens* Mels. Camden, Gloucester Co. (W), g. d. (Li).
- A. oblongicollis* Mels. Camden, Gloucester Co. (W), g. d. (Li), Hudson Co. (Ll), Clifton, Spring Lake (Ch), Lahaway, IV, 4.

DOLOPIUS Esch.

- D. lateralis* Esch. Caldwell (Cr), Hudson Co. (Ll), Landisville, Atco (Li), g. d. (W).

BETARMON Kies.

- B. bigeminatus* Rand. Ft. Lee (Bt), Hudson County (Ll).

GLYPHONYX Cand.

- G. recticollis* Say. Fort Lee, VI (Bt), Hudson County (Ll), Newark (Soc), g. d. (Li), Lahaway, V, 25, VI, 12, South River, V, 26, Anglesea, V, 28.
- G. testaceus* Mels. Anglesea, VII (Sz), g. d. (W, Li), Hudson County (Ll), Lahaway, V, 28.

MELANOTUS Esch.

- M. decumanus* Er. Ft Lee (Bt), Hudson Co. (Ll), g. d. (W), Orange, VI (Ch).
- M. secretus* Lec. Hopatcong (Pm), Atco (Li), Anglesea and South Jersey (W).
- M. ignobilis* Mels. "New Jersey" (Coll. Horn).
- M. depressus* Mels. G. d., not rare (W).
- M. angustatus* Er. G. d. (W).
- M. trapezoideus* Lec. G. d. (W).
- M. tænicollis* Lec. "New Jersey" (Horn), Ft. Lee (Sf), Westville, rare (W).
- M. leonardi* Lec. Greenwood Lake, V, 22 (Lv), South Amboy, under bark of pine (Bt).
- M. scrobicollis* Lec. Newark (Bf).
- M. glandicolor* Mels. Hudson County (Ll).
- M. fissilis* Say. Common throughout the State, VI, VII.
- M. communis* Gyll. Common throughout the State, VI and VII.
- M. exuberans* Lec. "New Jersey" (Horn).
- M. parumpunctatus* Mels. Hudson Co. (Ll), Ft. Lee (Bt).
- M. cribulosus* Lec. DaCosta on pine, V and VI (W).
- M. pertinax* Say. Newark (Bf, Dkn), Orange (Lg), Anglesea (W), Middlesex Co., VII, 7.
- M. dubius* Lec. Hopatcong (Pm), g. d. not rare (W), South River, VII, 8.
- M. tenax* Say. "New Jersey" (Horn).
- M. americanus* Hbst. Hopatcong (Pm), Hudson Co. (Ll), g. d. (W, Li), Anglesea, V, 28.
- M. insipiens* Say. Da Costa, V, on pine (W), g. d. (Li).
- M. variolatus* Lec. Newark (Soc).
- M. sagittarius* Say. Staten Island (Lg).

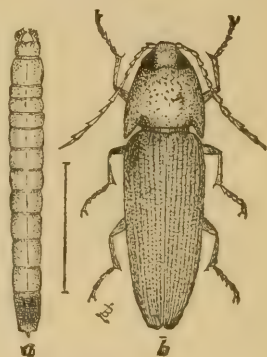


Fig. 100.—*Melanotus* species and its larva: enlarged.

LIMONIUS Esch.

- L. auripilis* Say. Atco (Li), Camden, Gloucester Co. (W), rare.
- L. stigma* Hbst. "New Jersey" (coll. Horn).
- L. griseus* Beauv. Throughout the State, May and June.
- L. interstitialis* Mels. Camden, Anglesea (W).
- L. confusus* Lec. Hopatcong (Pm), E. Jersey (Dietz), g. d. (Li).
- L. plebeius* Say. Hopatcong (Pm), Fort Lee (Bt), Hudson County (Ll), Newark, V (Soc), Cape May C. H., V, 28 (W).

L. æger Lec. Ocean County, not rare.

L. quercinus Say. Throughout the State, common, V, VI and VII.

L. basillaris Say. E. Jersey (Dietz), g. d. (Li, W), South River, V, 26, VII, 8.

L. agonus Say. Atlantic City (Castle), Newark, in May.

L. definitus Ziegl. Hopatcong (Pm), Atco, rare (Li).

L. nimbatus Say. Westville (Li), Hudson County (Ll), g. d. (W).

PITYOBIUS Lec.

P. anguinus Lec. Atlantic City (Li, Castle), Da Costa (Castle), South River, VII, 8.

ATHOUS Esch.

A. brightwellii Kirby. Ft Lee (Bt), Hudson Co. (Ll), Anglesea (W).

A. acanthus Say. Madison, V, 17 (Pr), Hudson Co. (Ll), g. d. (W), Lahaway, VI, 12, Middlesex, VII, 7; the *var puncticollis* somewhat more rare.

A. cucullatus Say. Fort Lee (Bt), Hudson Co. (Ll), Anglesea (Sz), g. d. (Li). Lahaway, VI, 1, VII, 12.

A. equestris Lec. "New Jersey" (coll. Horn).

OESTODUS Lec.

O. tenuicollis Rand. Ocean County.

SERICOSOMUS Steph.

S. viridanus Say. Sea Shore (Li), Da Costa (W).

S. silaceus Say. Staten Island, VI (Lg), Anglesea (W), Orange (Ch), Lahaway, VI, 1, 21.

S. debilis Say. Landisville, rare (Li).

CORYMBITES Latr.

C. tessellatus Linn. Hopatcong (Pm), Newark, VI, 2 (Soc), Snake Hill (Bt), Camden, Gloucester Counties (W).

C. cylindriiformis Hbst. Ft. Lee (Bt), Caldwell (Cr), Hudson Co. (Ll), Newark (Soc), g. d. (W, Li), New Brunswick, VI, 11.

C. pyrrhos Hbst. Hopatcong (Pm), Fort Lee, VI (Bt), Hudson Co. (Ll), Caldwell (Cr), g. d. (W, Li).

C. tarsalis Mels. Hopatcong (Pm), Fort Lee, VI (Bt), Snake Hill (Sf), Newark, V (Soc), g. d. (Li), on pine, IV and V (W), New Brunswick, Jamesburg, V, 4.

C. sulcicollis Say. "New Jersey," 1 specimen only (W).

C. æthiops Hbst. Hopatcong (Pm), Palisades, V, 17 (Lv), Ft. Lee, VI (Bt), Hudson Co. (Ll), Newark (Soc), g. d. (W).

C. medianus Germ. "New Jersey," VII and VIII (Bt).

C. hamatus Say. "New Jersey" (W).

C. hieroglyphicus Say. Greenwood Lake (Sf), Hudson Co. (Ll), Caldwell (Cr), Newark (Soc), g. d. (Li).

C. inflatus Lec. Gloucester (Li), Hudson County (Ll), Fort Lee, VI (Bt), Anglesea, V, 28.

ASAPHES Kirby.

A. decoloratus Say. Madison, V, 12 (Pr), Ft. Lee, VI (Bt), Hudson Co. (Ll), g. d. (W), Orange Mts.

A. memnonius Hbst. Throughout the State, V, VI and VII.

A. bilobatus Say. Hudson County (Ll), Caldwell (Cr), Ft. Lee (Bt), South Camden (W).

MELANACTES Lec.

M. piceus DeG. Throughout the State, VI and VII.

M. morio Fabr. Fort Lee (Bt) Caldwell (Cr), Newark (Soc), Camden, Gloucester Counties (W), Lahaway VI, 1.

CEBRIQ Oliv.

C. bicolor Fabr. "New Jersey," V (Bt), Camden, Gloucester Counties, rare (W).

PEROTHOPS Er.

P. mucida Gyll. Camden (Li), Anglesea (W), rare: from old beech trees (U).

CEROPHYTUM Latr.

C. pulsator Hald. Ft. Lee, 1 specimen (Sf).

Family THROSCIDÆ.

Resemble the Elateridæ, but the prothorax is firmly articulated to the mesothorax and the species have no power of leaping. They are usually found on dead wood or on flowers and are inconspicuous as well as small. None are of economic importance.

DRAPETES Redt.

D. geminatus Say. Westville, Buena Vista (Li), Hudson County (Ll), Ft. Lee (Bt); under rotten bark and on dead branches (Ch).

THROSCUS Latr.

T. constrictor Say. Newark (Bf), Lahaway, V, 28.

T. convergens Horn. Hopatcong (Pm).

T. chevrolati Bonv. Ft. Lee (Bt), Hudson Co. (Ll), Newark (Bf).



Fig. 101.—Work of sinuate pear borer on Bartlett pear tree; about $\frac{1}{4}$ natural size.

Family BUPRESTIDÆ.

These are stout beetles also resembling the click beetles in general form but broader and the prothorax not free, so they have no powers of leaping. They are metallic or otherwise brightly colored, the elytra smooth, striate or irregularly sculptured. The head is retracted to the eyes, and the antennæ are short, rather slender and serrated or saw-toothed.

The larvæ are wood borers, living under bark and making broad, rather shallow furrows, galleries and chambers. They are somewhat flattened in form, long, the segments well defined, head small, the anterior thoracic segments very much broadened so as to give the creature a hammer-like form, therefore they have been called "hammer-heads," or simply flat-headed borers. A number of these are of economic importance because they infest orchard trees. The larger species favor plants that are low in vitality from injury or other causes, hence trees may be protected by keeping them in healthy, growing condition. Others however, belonging to the genus *Agrilus*, of which the beetles are long, slender and cylindrical, attack plants in full vigor. One of these causes a gall on blackberry canes. These galls should be cut out in winter and burnt with the contained grub. Or the shoots made up to the first of July should be cut off at the surface because in them larvæ of the new brood are contained, depending for next year's crop on the shoots made later in the season.

The sinuate pear borer makes wavy galleries in pear trees and sometimes kills them. Trees may be protected by covering with paper May 20 to July 1st to prevent the exit of the insect from the tree or laying eggs on the trunk, or a heavy coat of whitewash may be maintained for the same period, adding an ounce of paris green to each pail of wash.

CHALCOPHORA Sol.

- C. virginiensis* Dru. G. d. (W), Westville (Li), Ft. Lee (Bt), Newark (Soc), Lahaway, in June : it breeds in pines.
C. liberta Germ. Atlantic Co. (W), Westville, Egg Harbor (Li), Newark, Orange Mts. (Bf), Lahaway, V, 15, 28 : also breeds in pine.
C. campestris Say. West Hoboken, on tulip trees (Ch) : breeds also in sycamore, beech, maple, etc.

DICERCA Esch.

- D. prolongata* Lec. Newark, V, 29, g. d., but rare (Bf). So far as known, almost all the species of this genus breed in deciduous trees.
D. divaricata Say. Throughout the State ; breeds in apple, beech, maple and a great variety of other deciduous trees ; but has not thus far proved injurious in New Jersey.
D. pugionata Germ. Gloucester Co. (W, Li), Hudson Co. (Li), Ft. Lee, VII (Sf). Newark district, g. d. (Bf). Occurs on black alder (W), and breeds also in *Spiræa opulifolia* (Hn).
D. obscura Fabr. Throughout the State, VI and VII ; the larva in hickory.
 var. *lurida* Fab. With the type and equally common.

- D. spreta* Gory. Anglesea, Camden and Gloucester Co. (W), Newark (Soc).
D. asperata Lap. and Gory. At the roots of hickory trees, Newark district, in spring (Bf), "New Jersey," rare (Li); probably breeds in oak (Ch).
D. punctulata Sch. Camden and Gloucester Cos. on pine, IV and V (W), Seashore (Li), Ft. Lee (Bt): always rare; breeds in pine (Ch).

PECILONOTA Esch.

- P. cyanipes* Say. Seashore, rare (Li), Newark (Soc).
P. thureura Say. Atlantic (W) and Gloucester Co. (Li), rare.

BUPRESTIS Linn.

- B. rufipes* Oliv. Seashore (Li), Anglesea, VII, on oak, and flying around dead wood, Cape May (W): breeds in oak and beech (Ch).
B. lineata Say. G. d. (Li), on pine, IV and V (W), Brigantine beach, in drifted wood (Hn), Newark (Bf).

This and probably nearly all the following, breed in pines.

- B. consularis* Gory. Seashore, rare (Li), Lahaway, VII, 5.
B. nuttalli Kirby. Generally distributed, rare (W).
B. fasciata Fabr. Gloucester Co., rare (W).
B. striata Fabr. Da Costa, V, 30 (W), Westville (Li), Newark (Soc), always rare: reared from pine (Ch).
B. decora Fabr. Gloucester Co., one specimen (W).
B. ultamarina Say. G. d., rare (Li), Camden and Gloucester Co., early in May, Da Costa, V, 30, Atlantic City as late as VI, 28 (W).

CINYRA Lap. and Gory.

- C. gracilipes* Mels. Gloucester Co. (W), Westville (Li), Hudson Co. (Ll): it breeds in oak.

MELANOPHILA Esch.

- M. longipes* Say. G. d. (W Li), Da Costa, V, on pines (W), Newark, Orange Mts. (Bf): all the species in this genus breed in Conifers.
M. fulvoguttata Harr. Orange Mts., on Spruce (W) and Hemlock (Bf).
M. æneola Mels. Landisville (Li), Atlantic City (Castle), Da Costa, on pine, in May (W).

ANTHAXIA Esch.

- A. æneogaster* Lap. Orange Mts., rare (Bf).
A. viridifrons Lap. G. d. (W), bred from hickory, and probably also attacks elm (Ch), Newark, Orange Mts., New Brunswick, Jamesburg.
A. viridicornis Say. Madison, VI, 18 (Pr), Orange Mts. (Bf), Staten Island (Lg).

- A. cyanella* Gory. G. d. (W). "This is identical with the following" (Ch).
A. quercata Fabr. G. d. (W), Da Costa (Li), Orange Mts. (Bf), Jamesburg, VII, 15: larva on grape and chestnut (Ch).
A. flavimana Gory. Generally distributed (W, Li).

CHRYSOBOTHRIS Esch.

- C. femorata* Fabr. Common throughout the State, from May to July, in many local varieties, some of which have names. The larva is the "flat-headed apple-borer," which attacks also other fruit and many forest trees, sometimes becoming injurious. It favors trees low in vitality, hence keeping trees in good condition is a good protective measure. Where they are actually in the wood they can be cut out, their location being usually discernible by a slight discoloration of the bark.

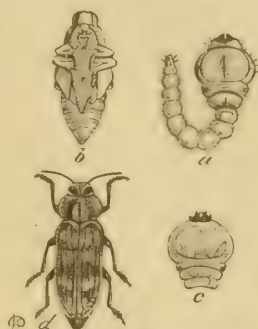


Fig. 102—*Chrysobothris femorata*: a, larva; b, pupa; c, adult.

- C. floricola* Gory. Cape May C. H., V, 28, on pine, g. d. (W), Landisville, Da Costa (Li), Hudson Co. (Li): it breeds in pine.
C. dentipes Germ. G. d. (W), Gloucester, Da Costa (Li), Hudson Co. (Li): the larva infests pine.
C. pusilla Lap and Gory. Landisville, Da Costa (Li), Atlantic Co., Cape May C. H., Anglesea, V, 28, on pine (W), Newark (Bf).
C. sexsignata Say. G. d. (Li), Camden and Gloucester Co. (W), Hudson Co. (Li), Orange Mts. (Bf). Reared from beech, taken on chestnut and also affects birch (Ch).
C. azurea Lec.=*chrysoela* Da Costa. Atco, Anglesea (W), Buena Vista (Li), Orange Mts. (Sm), on sumach (Bf), Ft. Lee (Sf), Staten Island, abundant one season on branches of *Cornus paniculata* (Lg).
C. scitula Gory.=*chlorocephala*. G. d. (W), Landisville, Da Costa (Li), rare: said to breed in deciduous trees.

ACTENODES Lac.

- A. acornis* Say. Newark, Orange Mts., rare (Bf), Seashore (Li), Atlantic Co., on pine, Anglesea, common in wash up, V and VI (W), VII, 4 (Love), Brigantine beach, IX (Hn).

ACMÆODERA Esch.

- A. ornata* Fabr. G. d. (W). All the species occur on flowers and their breeding habits seem to be unknown.
A. pulchella Hbst. Atco (Li), Atlantic Co. (W).
A. culta Web. Found throughout the State, V and VI.

PTOSIMA Sol.

P. gibbicollis Say. Sea shore (Li), Anglesea (W), rare. Reared from red-bud, *Cercis canadensis* (Ch), and also found on black locust (Sz).

MASTOGENIUS Sol.

M. subcyaneus Lec. Camden and Gloucester Co., Anglesea, VII, on dead oak (W), Landisville (Li), Hudson Co. (Ll), Newark district on willow (Bf); also on oak (U).

EUPRISTOCERUS Deyr.

E. cogitans Web. Camden and Gloucester Co., black alder (W), Westville (Li), Hudson Co. (Ll), Newark district on black alder (Bf), Palisades, V, 7, bred from alder (Love).

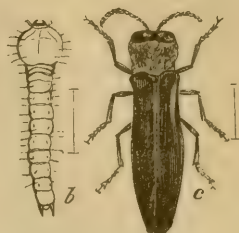


Fig. 103.—Blackberry gall maker; δ , larva; *c*, adult: enlarged.

AGRILUS Steph.

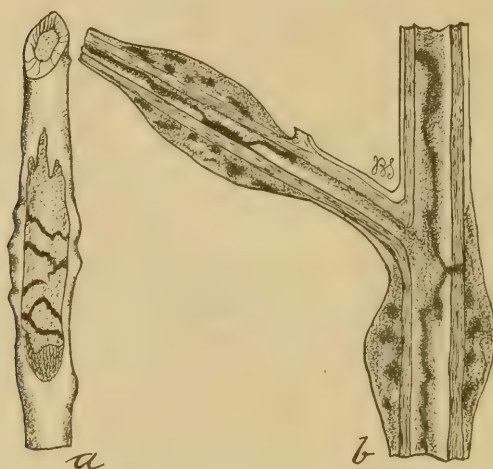


Fig. 104.—Blackberry gall: *a*, swellings just begun over recent borings; *c*, section through an old stem to show appearance of gall.

A. ruficollis Fabr. Common throughout the State in June. The larva bores in the stems of blackberry and raspberry, forming galls on some varieties and becoming seriously injurious in Atlantic and Cumberland Counties. Methods of treatment have been already mentioned.

A. lateralis Say. South Jersey, rare (W), Buena Vista (Li), Eagle Rock, one specimen (Bf), Staten Island (Lg).

- A. otiosus* Say. Occurs throughout the State, rather commonly. Breeds in hickory, oak, locust, &c.
- A. arcuatus* Say, = *fulgens* Lec. Westville (Li), South Jersey (W), not common. Found on and probably breeds in hazel.
- A. vittaticollis* Rand. South Jersey, rare (W), Buena Vista (Li), breeds in *Kalmia* and chestnut.
- A. bilineatus* Web. Not rare throughout the State in June. The larva is injurious in chestnuts and also attacks oak (Ch).
- A. granulatus* Say. South Jersey, rare (W), Staten Island (Lg).
- A. anxius* Gory. South Jersey, not common (W).
- A. acutipennis* Mann. Woodside (Bf).
- A. politus* Say. = *plumbeus* Lec. South Jersey (W), Newark (Soc), Hudson Co. (Ll), Madison, VI, 10 (Pr). Recorded as on willow (Ch, Hn) and oak.

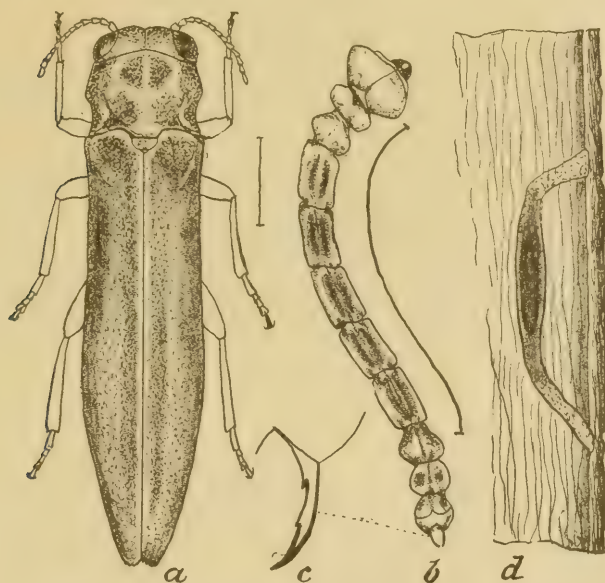


Fig. 105.—Sinuate pear borer: *a*, adult; *b*, larva; *c*, its anal fork; *d*, section to show pupal chamber in solid wood.

- A. sinuatus* Oliv. Irvington, Verona, Newark, Roselle, New Brunswick. An introduced species, yet very local. Imago, in June; larva bores in sapwood of pear, causing serious injury and requiring two years to mature.
- A. fallax* Say. Camden and Gloucester Co. (W).
- A. obsoletoguttatus* Gory. = *interruptus* Lec. Hudson Co. (Ll), Newark district (Bf), South Jersey (W), Clifton, V, Highlands, VI, on oak (Ch), Staten Island (Lg).

- A. subcinctus* Gory. Westville (Li), South Jersey (W), Madison (Pr).
A. lecontei Saund. Hudson Co. (Ll), South Jersey (W).
A. egenus Gory. Occurs throughout the State not rarely. On willows, near Newark (Bf), Orange, Highlands, VI, breeds in locust (Ch), Lahaway, late in May on cranberry bogs, probably accidental, though in several specimens.
A. pusillus Say. South Jersey, not common (W).

RHÆBOSCELIS Chev.

- R. tenuis* Lec. Anglesea, VII (W), on low plants in swampy glades.

TAPHROCERUS Sol.

- T. gracilis* Say. G. d. (Li, W), Hudson Co. (Ll), Newark district, V, 29 (Bf), Madison, VIII, 15 (Pr), Anglesea, VI, New Brunswick. Found beating in swampy meadows.

BRACHYS Sol.

- B. ovata* Web. Common throughout the State, VI to VIII, on oak.
 var. *tessellata* Fabr. Newark (Soc), Da Costa, on pine (W), Greenwood Lake, VI, 21 (Love).
B. ærosa Mels. Not rare throughout the State, V and VI, on oak.

PACHYSCELIS Sol.

- P. purpureus* Say. Hemlock Falls, V, 31 (W), Orange Mts., VI, 4 (Bf), Madison, X, 15 (Pr), Ft. Lee (Sf): larva mines leaves of *Lespedeza* (Sz).
P. lævigatus Say. Occurs throughout the State. Orange Mts., VI, 26 (Bf), Anglesea, V, 28.

Family LAMPYRIDÆ.

This family contains the "fire-flies" and "soldier beetles." They are long, narrow, somewhat flattened beetles, with soft, leathery wing covers and a flexible abdomen. The antennæ are usually long, the joints more or less evidently serrated, and sometimes even flabellate in the male. The interesting feature in a number of the species is the power of emitting a phosphorescent light from the tip of the abdomen. This light is entirely in the control of the insects, and varies in the different species. The "glow-worms" that are sometimes seen in the grass are the larvæ or wingless females. In the larval stage they feed on snails or on other soft-bodied insects.

The soldier beetles have a narrower thorax and a larger head than the fire-flies, but are of the same soft body texture. Their larvæ are flattened above, fusiform, and also predatory, feeding upon soft-bodied insects or grubs when they enter the earth to pupate.

LYCOSTOMUS Mots.

L. lateralis Mels. Eastern N. J. (Dietz).

CALOPTERON Guer.

C. terminale Say. Hudson Co. (Ll).

C. reticulatum Fabr. Throughout the State, not rare; Staten Island (Lg), Sandy Hook, Lahaway, VII, VIII and IX.

CELETES Newn.

C. basalis Lec. Seashore (Li), Hudson Co. (Ll), Lahaway, VI, 12.

CÆNIA Newn.

C. dimidiata Fabr. Seashore (Li), Atco (W), Caldwell (Cr).

LOPHEROS Lec.

L. fraternus Rand. Paterson (Sm).

EROS Newn.

E. thoracicus Rand. Westville, rare (Li).

E. aurora Hbst. Gloucester Co. (W), g. d. (Li).

E. humeralis Fabr. Jamesburg, VI, 16.

E. trilineatus Mels. Westville (Li), South Jersey (W), Hudson Co. (Ll), Jamesburg, VII, 15, Lahaway, VII, 9, Middlesex Co., VII, 7.

PLATEROS Bourg.

P. timidus Lec. Hudson Co. (Ll).

P. modestus Say. Atco (Li), g. d. (W), Hudson Co. (Ll), Middlesex Co., VII, 7, South Jersey, VII, 8.

P. canaliculatus Say. G. d. (Li), Hudson Co. (Ll), Jamesburg, VII, 4, 15, VIII, 11, Sandy Hook, VII.

P. floralis Mels. Spring Lake, IX (Ch), Atco (Li), Jamesburg, VII, 15, Middlesex Co., VII, 7.

CALOCHROMUS Guer.

C. perfaceta Say. G. d. (Li), Orange Mts. (Sm), rare. The species in this series are generally taken on flowers or bushes in beating or sweeping.

LUCIDOTA Lap.

L. atra Say. Gloucester (Li), Hudson Co. (Ll), Newark, Lahaway, V, 11-VII, 5. Throughout the State and almost all summer.

L. punctata Lec. Da Costa (Li).

ELLYCHNIA Lec.

E. corrusca Linn. G. d. (W, Li), Newark, Jamesburg, IV, 18 to VIII, 11, Lahaway, IX, 22, X, 6, XI, 8. Occurs therefore throughout the season and almost everywhere.

PYROPYGA Mots.

P. nigricans Say. Hudson Co. (Li), Jamesburg, IV, 18.

P. decipiens Harr. G. d. (Li, W), Madison (Pr), New Brunswick, VII, 20, South River, VII, 8. Found throughout the State.

PYRACTOMENA Lec.

P. angulata Say. Throughout the State, but nowhere common: one of our most brilliant fire-flies.

P. ecostata Lec. Anglesea, VII, in salt meadows (W, Sm): the larva in the marsh among snails.

P. lucifera Mels. G. d. (W, Li), Anglesea, VI, 20.

PHOTINUS Lap.

P. consanguineus Lec. G. d. (Li), Anglesea (W), Hudson Co. (Li), Orange (Ch).

P. lineellus Lec. Atco, rare (Li), Orange (Ch).

P. pyralis Linn. Newark Hudson Co., New Brunswick, common: it is a moderate sized species with quite a bright light.



Fig. 106.—Fire-fly, *Photinus pyralis*: *a*, larva; *b*, pupa in underground cell; *c*, adult; *d* to *f*, enlarged details of larva.

P. marginellus Lec. G. d. (W, Li), Caldwell (Cr), New Brunswick. The male of this species is half-winged (W). It is locally the most common species, flies low and has a yellow light.

P. scintillans Say. G. d. (Li), Caldwell (Cr), Orange, Netherwood (Ch), New Brunswick, the commonest form, flight and light as in the preceding. The female is half-winged.

TYTTHONYX Lec.

T. erythrocephalus Fabr. Atco, Buena Vista (Li), Westville (W).

OMETHUS Lec.

O. marginatus Lec. Atco, rare (Li).

PHOTURIS Lec.

- P. pennsylvanica* DeG. The largest and most brilliant of our June fire-flies, flying high and shining with a greenish light; quite generally distributed, though it seems to be absent in some localities.
- P. frontalis* Lec. Anglesea in July (W. et als). It is smaller than the preceding, but with a similar light.

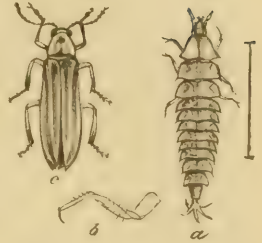


Fig. 107.—*Photuris pennsylvanica*; a, larva; b, its leg; c, adult: a and b enlarged.

PHENGODES Ill.

- P. laticollis* Lec. Lahaway, V, 15, one specimen.
- P. plumosa* Oliv. Staten Island, June, one specimen (Ds). The males of these species are not luminous; but the larvæ and adult females are among the most brilliant of our forms. They are very rare.

CHAULIOGNATHUS Hentz.

- C. pennsylvanicus* DeG. Throughout the State in fall, often on golden rod: one of the "soldier beetles," predatory in the larval stage, and devours burrowing larvæ like that of the curculio, &c.; therefore beneficial.
- C. marginatus* Fabr. Throughout the State in late spring and summer; habits as before.

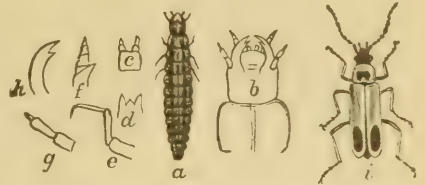


Fig. 108.—Soldier beetle, *Chauliognathus pennsylvanicus*; a, larva; i, beetle; other letters refer to structural details.

PODABRUS Westw.

- P. tricostatus* Say. Hopatcong (Pm), Orange (Ch), Hudson Co. (Ll), Montclair, Lahaway, VI.
- P. rugulosus* Lec. Hudson Co. (Ll), g. d. (W, Li).
- P. frater* Lec. Hopatcong (Pm), Westville (Li), g. d. (W), New Brunswick, Burlington Co., VII, Lahaway, V, 12, VII, 11.
- P. basilaris* Say. Hopatcong (Pm), Madison (Pr), Caldwell (Cr), Orange (Ch), Hudson Co. (Ll), Anglesea (W), g. d. (Li), Lahaway, VI.
- P. diadema* Fabr. Gloucester (Li), Anglesea, VI, 26.
- P. modestus* Say. Hopatcong (Pm), Caldwell (Cr), Atco (Li), Atlantic Co., V, 25.

P. comes Lec. Orange Mts., rare : Mr. Wenzel doubts this.

P. tomentosus Say. G. d., rare (Ll).

P. protensus Lec. Hudson Co. (Ll).

P. brunnicollis Lec. Atco, rare (Li).

TELEPHORUS Schöff.

T. dentiger Lec. Hudson Co. (Ll), Highlands (Ch), Newark V.

T. excavatus Lec. Hudson Co. (Ll), Spring Lake (Ch), Da Costa (Li), g. d. (W), Lahaway, V, VI, Anglesea, V, 28.

T. fraxini Say. Atco (Li), g. d. (W).

T. carolinus Fabr. Common throughout the State, V, VI, VII : all the species on flowers and foliage.

T. lineola Fabr. Also common and g. d., V, VI.

T. rectus Mels. G. d., not common (W), South River, VII, 8.

T. flavipes Lec. Hopatcong (Pm), Newark (Soc).

T. scitulus Say. Abundant on flowers everywhere until mid-summer.

T. pusillus Lec. Atco, rare (Li).

T. rotundicollis Say. Hopatcong (Pm), Hudson Co. (Ll), Newark (Soc), Westville (Li), New Brunswick.

T. tuberculatus Lec. Hopatcong (Pm), g. d. IV, Ocean county, common.

T. bilineatus Say. Throughout the State, V, VI, usually not common.

POLEMIUS Lec.

P. laticornis Say. Eastern New Jersey (Dietz), "New Jersey" (Lg).

DITEMNUS Lec.

D. bidentatus Say. Hopatcong (Pm), Hudson Co. (Ll), g. d. (Li), Orange Mts., VIII, 7, Lahaway, V, 21.

TRYPHERUS Lec.

T. latipennis Germ. Hopatcong (Pm), Hudson Co. (Ll), Atco (Li), Anglesea (W).

MALTHINUS Latr.

M. occipitalis Lec. Atco (Li), Westville (W), Anglesea, V, 28.

MALTHODES Kies.

M. concavus Lec. Hudson Co. (Ll).

M. spado Lec. Eastern New Jersey (Dietz).

Family MALACHIDÆ.

These insects resemble the preceding by the generally soft wing-covers, but they are shorter, broader, the elytra not nearly so long and often a little truncated posteriorly, the broadest part of the body coming near the end of the wing covers. In the species of *Collops* there are orange-colored protrusible vesicles at the sides of the thorax which are supposed to be defensive in character. The antennæ are short, a little enlarged at the tip and often curiously knotted in the male.

All of them are found on flowers or herbage, some only in low or moist locations, and they are said to feed on insect eggs, larvæ and smaller insects generally. The larvæ, so far as known, are predaceous.

COLLOPS Er.

C. tricolor Say. Sea Girt (Bf).

C. eximius Er. Hudson Co. (Ll), Orange Mts., Newark (Bf), g. d. (W, Li), Sandy Hook, VIII, 17.

C. nigriceps Lec. Hudson Co. (Ll), g. d. (W).

C. 4-maculata Fabr. Throughout the State, the most common species of the genus.

ANTHOCOMUS Er.

A. flavilabris Say. Hudson Co. (Ll).

PSEUDOBÆUS Horn.

P. oblitus Lec. Hopatcong (Pm), Hudson Co., (Ll), Woodside (Bf), Orange Mts., New Brunswick, VII, 20.

ATTALUS Er.

A. nigrellus Lec. Hopatcong (Pm).

A. terminalis Lec. Hopatcong (Pm), Hudson Co. (Ll), Ocean Co., Jamesburg, VII, 15.

A. morulus Lec. Hudson Co., (Ll), Orange Mts., Lahaway, VI, 1.

A. granularis Er. Anglesea, VII (Sz).

A. otiosus Say. Anglesea (W).

A. circumscriptus Say. Atco (Li).

A. scincetus Say. Orange Mts. (Sm), VI, 4 (Bf), Hudson Co. (Ll), g. d. (Li), Jamesburg, Anglesea, V, 28.

PRISTOSCELIS Lec.

P. rufipennis Lec. Newark, VII, g. d., V, 31 (Bf).

P. comatus Lec. Hopatcong (Pm).

Family CLERIDÆ.

The flower beetles are firmer in texture than those of the last preceding families, yet not so hard-shelled as are the click beetles, or even the following Ptinids. The feelers are usually more or less serrated or saw-toothed, but may also have a distinct club or comb at the tip. The head is of good size, with large eyes, the thorax being narrower than either head or elytra. The latter cover the abdomen completely and are often clothed with hair. In color they vary, but are usually bright, sometimes shining, and often prettily banded. The beetles may be found on flowers or running on the trunks of trees, where they somewhat resemble ants in their motions. The genus *Necrobia* lives in all stages on carrion, and is the exception in a family in which most of the larvæ thus far known are predatory. These larvæ are usually red or brown in color, and are found under bark or in the burrows of wood-borers, upon which they feed. One of the species, *Chariessa pilosa*, has developed into an effective check for the "sinuate pear-borer," and others are undoubtedly useful in keeping down other wood-borers. Their work is done under cover, and is rarely noticed; hence the extent of the benefit derived from them is unknown.

The European *Clerus formicarius* has been intentionally introduced into West Virginia as a check to the bark-beetles that seriously damage timber there; but there is not, as yet, any definite information concerning the success or failure of the attempt at acclimatization.

ELASMOCERUS Lec.

E. terminatus Say. Ft. Lee (Joutel), Orange Mts. (Bf); found on trees infested with Scolytids and *Bostrychus* (U), not common.

CYMATODERA Gray.

C. bicolor Say. Ft. Lee (Sf), Orange Mts. (Bf), Westville (Li), g. d. (W), Lahaway, VII, 5; rare.

C. inornata Say. Ft. Lee (Sf), Hudson Co. (Li), Da Costa, VII, 27 (W).

C. balteata Lec. Highlands (O. Dietz), Riverton, VIII, 21 (Jn), Camden (Li), Da Costa, VII, 26, g. d. (W), Bordentown, VII, Lahaway, IX, 6.

TRICHODES Hbst.

T. apivorus Germ. Da Costa, VI, VII (W); found on flowers of *Spirææ*.

CLERUS Geoff.

C. quadriguttatus Oliv. Hudson Co. (Li), g. d. (W, Li); found running on pine (U).

C. rosmarus Say. Throughout the State on flowers.

C. lunatus Spin. Da Costa (Li), g. d. (W).

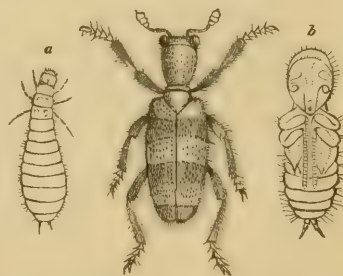


Fig. 109.—*Trichodes apivorus*: a, larva; b, pupa; adult beetle in centre: enlarged.

C. thoracicus Oliv. Madison, V, 30 (Pr), Orange Mts., VI, 26, Newark district, V, 13 (Bf), Hudson Co (Ll), g. d. (W, Li), Anglesea; found on deciduous trees and on flowers.

THANASIMUS Latr.

T. dubius Fabr. Madison, X, 31 (Pr), Hudson Co. (Ll), g. d., but local (W).

THANEROCLERUS Spin.

T. sanguineus Say. Madison (Pr), seashore (Li); rare under bark of dead trees throughout the State.

HYDNOCERA Newm.

H. unifasciata Say. Madison, VII, 28 (Pr), Orange Mts., Woodside (Bf), Hudson Co. (Ll), Atco (Li), g. d. (W); always rare.

H. subænea Spin. Orange Mts., Newark, VI, 1, VII, 25, Ocean Beach (Bf).

H. humeralis Say. Throughout the State, V, VI, VII, common, and occurs in two varieties.

var. cyanescens Lec., and *var. difficilis* Lec.

H. pallipennis Say. Orange Mts., Newark district (Bf), Hudson Co. (Ll), g. d. (W, Li), Anglesea, VII, 23; not rare.

H. pedalis Lec. Eastern New Jersey (Dietz).

H. verticalis Say. Occurs with *pallipennis*.

H. tabida Lec. Eastern N. J. (Dietz), DaCosta, rare (Li).

H. longicollis Say. Madison (Pr), Eastern N. J. (Dietz), Atco, rare (Li).

ICHNEA Lap.

I. laticornis Say. Hopatcong (Pm), Ft. Lee (Sf), Palisades, VI, 19, and raised from hickory infested by *Scolytus 4-spinosus* (Lv), Newark, g. d. (Bf).

PHYLLOBÆNUS Spin.

P. dislocatus Say. Hopatcong (Pm), Ft. Lee (Sf), Hudson Co. (Ll), Camden, rare (Li); occurs on dead branches, and also found sweeping among flowering shrubs.

CHARIESSA Partz.

C. vestita Spin. Hudson Co. (Ll), Orange Mts., rare (Bf); all the species on dead trees or branches.

C. dichroa Lec. G. d., rare (W).

C. pilosa Först. Palisades, VII, 19, from dead oak (Lv), Hudson Co (Ll), Caldwell (Cr), Newark district on dry oak (Bf), g. d. (W, Li); bred from pear infested by *Agilus sinuatus* Irvington, a larva probably of this species feeding upon the sinuate borer, and more especially its pupa.
var onusta Say. G. d., not common (Li).

CREGYA Lec.

C. vetusta Spin. Highlands (O. Dietz), Westville (Li), g. d. (W); always rare.

C. oculata Say. Ft. Lee (Sf), Hudson Co. (Ll), Orange Mts., Jamesburg, VII, 4 (Bf), g. d. (W, Li), Anglesea, VII, 23.

ORTHOPLÉURA Spin.

O. damicornis Fabr. Hopatcong (Pm), Orange Mts., Newark (Bf), g. d. rare (Li).

LARICOBIOUS Rosen.

L. erichsoni Rosen. Staten Island (Lg), Orange Mts., rare (Bf).

NECROBIA Latr.

N. rufipes Fabr. Throughout the State: the red-legged ham beetle; cosmopolitan and occurs on drying carrion, drying bones, fish, cheese, &c., as well as on ham (Ch).

N. ruficollis Fabr. Throughout the State, with the same general habits and more common than the preceding.

N. violaceus Linn. Same habits and distribution as in the preceding two species.



Fig. 110.—Red-legged ham beetle, *Necrobia rufipes*: a, larva; b, pupa; c, cocoon; d, e, beetle; natural size and enlarged: f to j, structural details.

Family PTINIDÆ.

A very interesting group of beetles, varying greatly in form, so that no general description is adequate, and only the fact that the prothorax extends forward over the head somewhat hood-like, is of general application. They are hard in texture and the elytra, which may be smooth, striate, punctate, shining, hairy or scaly, are not abbreviated but cover the entire abdomen. The head is usually well bent under, not visible from above, and the antennæ are slender, with a prominent serrate, lamellate or pectinated club, though sometimes rather evenly serrate. They live on dry vegetable or animal products, usually the former, and some of them bore into the wood-work of old houses and old furniture making a ticking sound that gives them the name death watch. All sorts of things, from *Belladonna* roots to cigars, or even gun wads, serve as food; but only a few species become economically important.

The larvæ occur with the adults and are white, soft, grub-like creatures, curled in a semi-circle like the white grubs and covered with short stiff hair or bristles.



Fig 114.

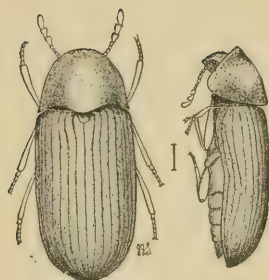


Fig. 111.



Fig. 113.

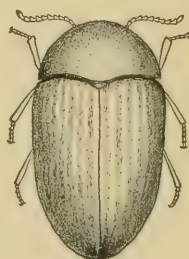


Fig. 113.



Fig. 112.

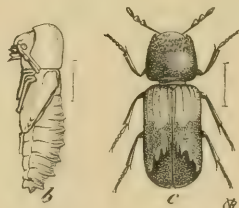


Fig. 115.

Fig. 111.—*Sitodrepa panicea*, from side and above : enlarged.

Fig. 112.—Larva of *Sitodrepa panicea* : enlarged.

Fig. 113.—The "cigarette beetle," *Lasioderma serricorne*, from side and above : enlarged.

Fig. 114.—Cigars eaten by larva of *Lasioderma*

Fig. 115.—*Sinoxylon basilare*; *a*, larva; *b*, pupa; *c*, adult : enlarged.

PTINUS Linn.

- P. fur* Linn. Caldwell (Cr), Jersey City, Newark (Bf), Camden (Li), g. d. (W); hardly common, anywhere.
- P. brunneus* Duft. Camden, rare (Li): both species are sometimes injurious, live in store-rooms and cellars, particularly of old houses, and the larvæ will develop in dried organic matter such as dung of domestic animals or ground cereals.

EUCRADA Lec.

- E. humeralis* Mels. Ft. Lee (Sf), Hopatcong (Pm), Orange Mts., VI, 9 (Bf), New Brunswick; not common anywhere.

ERNOBIUS Thom.

- E. mollis* Lin. Ft. Lee (Sf), Orange Mts., VI, 3, Newark (Bf), g. d. (W, Li), Lahaway; not common, occurs on old wood.
- E. granulatus* Lec. Brigantine beach, once only, six specimens, IX (Hn); on pine branches (U).
- E. luteipennis* Lec. Westville, rare (Li), on pine trees (Sz).

OZOGNATHUS Lec.

- O. floridanus* Lec. Anglesea (W); a floridian form.

OLIGOMERUS Redt.

- O. sericans* Mels. Orange Mts., one spec. (Bf), Anglesea, VII (Sz), Lahaway, VI, 7.
- O. alternatus* Lec. Anglesea and South Jersey (W).

SITODREPA Thom.

- S. panicea* Linn. Throughout the State: breeds in dry roots and stored vegetable products of all kinds; also in rattan, willow and wood-work, in paper or pasteboard and similar stores. Liberal applications of gasoline, where practical, or exposure to the fumes of bisulphide of carbon, may be resorted to to destroy the pests.

HADROBREGMUS Thom.

- H. errans* Mels. Orange Mts., Newark (Bf), Westville (Li), Anglesea, VII (Sz); occurs on dead branches, and is nowhere common.
- H. carinatus* Say. Union, Orange Mts, V, 30 (Bf), Westville, not rare (Li).
- H. pumilio* Lec. Orange Mts., rare (Bf).

TRICHODESMA Lec.

- T. gibbosa* Say. Newark, Orange Mts., VI, 2 (Bf), Westville, (Li), Gloucester (W); always rare.

ANOBIUM Fabr.

A. notatum Say. Madison, V, 14 (Pr).

A. quadrulum Lec. Anglesea, VI, 2.

TRYPOPITYS Redt.

T. sericeus Say. Hopatcong (Pm), Madison (Pr), Milburn, Hudson Co., VI, 12 (Bf), Anglesea, VII (W), Palisades, Lahaway; on dead branches.

PETALIUM Lec.

P. bistriatum Say. Orange Mts., common (Bf), Anglesea, VII (Sz), several localities (Li), South Jersey (W).

EUPACTES Lec.

E. nitidus Lec. Hudson Co. (Li), Orange Mts. (Bf), Anglesea (W).

XYLETINUS Latr.

X. peltatus Harr. Orange Mts., on hickory (Bf), Anglesea (W), g. d. (Li), always rare.

X. fucatus Lec. Caldwell (Cr).

X. lugubris Lec. Orange Mts., rare (Bf).

LASIODERMA Steph.

L. serricorne Fabr. Throughout the State: the "tobacco beetle" or "cigarette beetle," attacks tobacco in all forms, and breeds also in other dried vegetable products, its general habits being similar to those of *Sitodrepa*; the same remedial measures being also useful.

L. n. sp. Horn, dixit. Anglesea, VII (Sz).

CATORAMA Guér.

C. holosericea Lec. Anglesea (W).

C. sectans Lec. Anglesea (W).

HEMIPTYCHUS Lec.

H. gravis Lec. Anglesea (W); the species on dead wood.

H. similis Lec. Orange Mts., rare (Bf).

DORCATOMA Hbst.

D. setulosum Lec. Anglesea (W); on dead branches.

PROTHECA Lec.

P. puberula Lec. Orange Mts. (Bf), g. d. (W); rare.

CÆNOCARA Thom.

C. oculata Say. Hopatcong (Pm), Newark (Soc), Anglesea (W), g. d. (Bf, Li).

PTILINUS Geoff.

P. ruficornis Say. Ft. Lee, one specimen (Sf), Orange Mts. (Bf), Landisville (Li); always rare.

ENDECATOMUS Mell.

E. reticulatus Hbst. G. d., in fungus, under bark (Bf), g. d., not rare (Li).

E. rugosus Rand. Staten Island (Lg).

SINOXYLON Duft.

S. basilare Say. Ft. Lee (Bt), Orange, VI, at light (Bf, Ch), g. d. (W); boring in dead twigs.

S. bidentatum Horn. Hopatcong (Pm), Orange Mts. (Bf).

AMPHICERUS, Lec.

Fig. 116.—The "apple twig borer," *a*, beetle from above; *b*, same in outline from side; *c*, *e*, *f*, structural details; *d*, larva; *g*, pupa; *h*, same in larval burrow: all save *h* enlarged.

- A. bicaudatus* Say. The "apple twig borer," found throughout the State more or less commonly. The adult bores into apple twigs at a bud and makes galleries varying in length for food and shelter only: the larva lives in the roots of the green or "cat" briar and in dead grape vines: remedial measures are, therefore, to destroy these breeding places.

BOSTRICHUS Geoff.

- B. bicornis* Web. Throughout the State, V, VI, VII, often at light; bores into dead twigs and branches.
- B. truncaticollis* Lec. Newark, Orange Mts., VI, 16 (Bf).
- B. capucinus* Linn. Newark, in imported sweet wood, at a licorice factory. The species has spread from its original point of importation and seems to have maintained itself for several years: it is therefore listed as a warning.

DINODERUS Steph.

- D. porcatus* Lec. Newark, at light (Bf), seashore (Li).
- D. cribratus* Lec. Newark district (Bf), g. d. (Li).

LYCTUS Fabr.

- L. unipunctatus* Hbst.=*striatus* Mels. Hudson Co. (Ll), Newark (Soc); occurs in dry wood, often when manufactured in furniture or trimming; on Jersey City Heights a mantel frame, &c., was completely riddled by the insects that escaped through the varnished and polished surface.
- L. opaculus* Lec. Ft. Lee (Bt), Hudson Co. (Ll), Orange Mts., common (Bf): larva breeds in grape stems and adults attack wood used in manufacturing implements (Ch).

Family CUPESIDÆ.

Contains only two species of very long, somewhat flattened and very roughly-sculptured beetles. The head and thorax narrower than the wing covers and the eyes prominent. They are brown in color, the sculpture of the elytra consists of deep grooves, separated by elevated ridges, the punctures very beautifully impressed when seen under the microscope, and the surface clothed with scales. They are found on dead wood or under bark, and are not in any way injurious—nor on the other hand appreciably useful.

CUPES Fabr.

- C. concolor* Westw. Madison, VIII, 14 (Pr), Ft. Lee, VI (Bt), Palisades, VI, on dead oak (Lv), Orange Mts. (Bf), Gloucester (W); never common.
- C. capitatus* Fabr. Ft. Lee, VI (Bt), Caldwell (Cr), "New Jersey" (Ll).

Family LYMEXYLIDÆ.

Only a single species, brown in color, very long, slender, cylindrical, tapering posteriorly and covered with a very fine silky pubescence. It is very rare as an adult, though the larva, or the very slender, irregular boring which it makes in old oak wood, is more frequently seen. A European species, *L. navale*, has been extremely destructive to ship timber, and some damage is done by this or an allied species in our Southern States; in New Jersey no injury has yet been caused.

LYMEXYLON Fabr.

L. sericeum Harr. Newark, one specimen (Bf), Gloucester, rare (W); bores in old oak wood.

Family CIOIDÆ.

Small oblong beetles, brown or black in color, convex above, with short, clubbed feelers, the head retracted though not concealed. They do not exceed $\frac{1}{8}$ inch in length, live in fungi or decaying wood, and are not of economic importance. The family is of small extent; we have very few species in New Jersey, these are rarely well represented in our collections, and are, as a rule, undetermined. The larvæ occur with the adults, are grub-like in form, and have two curved spines at the end of the tail.

CIS Latr.

C. fuscipes Mell. Hopatcong (Pm), Hudson Co. (Ll), Newark district, New Brunswick.

C. punctatus Mell. Anglesea, VII (Sz), g. d. (W): there are a number of undetermined species in collections, and some of them, perhaps, undescribed.

ENNEARTHRON Mell.

E. thoracicornis Ziegl. Ft. Lee, VI (Bt), Anglesea, VII (Sz), g. d., not rare (IV).

CERACIS Mell.

C. sallei Mell. Eastern New Jersey (Dietz).

RHIPIDANDRUS Lec.

R. paradoxus Beauv. Ft. Lee (Sf).

Family SPHINDIDÆ.

Very small smoky-brown species, much like the *Cioidæ* in general appearance, but differing structurally. Our only species lives in fungi and is not of economic importance.

SPHINDUS Chev.

S. americanus Lec. Ft. Lee, Snake Hill (Sf), Newark (Bf), Anglesea (W); probably throughout the State, though perhaps local and nowhere common.

Family LUCANIDÆ.

The "stag beetles," so-called because the male has in some cases very large, branched mandibles, somewhat resembling a stag's horns. Our common species, however, are better known as "pinching bugs," the mandibles being of moderate size and not branched. The beetles are all large and recognizable by having a leaf-like club at the end of antennæ, the parts of which cannot be closely opposed to each other or folded.

The larvæ are white grubs and live in decaying wood. Those of *Passalus cornutus* are very common in old stumps and logs and are peculiar in having four feet only developed. They are not in any case injurious.

LUCANUS Linn.

L. elaphus Fabr. Anglesea, one male specimen (W).

L. dama Thunb. Occurs throughout the State, June and July; sometimes locally common.

DORCUS MacL.

D. parallelus Say. Throughout the State, VI, VII, in white rotten wood: locally common.

D. brevis Say. Da Costa: the only recorded locality for the species.

PLATYCERUS Geoff.

P. quercus Web. Recorded from all parts of the State: cut out of rotten wood in March and found occasionally in branches until July.

CERUCHUS MacL.

C. piceus. Web. Common in rotten beech all the year around (Bf), and recorded from all sections of the State.

NICAGUS Lec.

N. obscurus Lec. Gloucester, not common (W, Li), in sand banks (Ulke).

PASSALUS Fabr.

P. cornutus Fabr. Common everywhere throughout the State in rotten wood.

Family SCARABÆIDÆ.

These are the "lamellicorn" beetles, in which the antenna has an oval club at the tip, composed of from three to seven leaves or lamellæ, usually much longer in the male. These leaves are closely opposable, so that at rest the club seems solid. The species vary much in shape and appearance, and range from small to very large; in habits, from feeders on leaves to burrowers in excrement. In all of them the legs are formed for digging, the fore-tibiæ being almost always flattened and toothed at the outer edge. The tarsi are generally long, except on the fore-legs, and always 5-jointed, so that the insects are easily recognizable.



Fig. 117.—Antenna of a Lamellicorn beetle to show the structure of club.

The larvæ are white grubs and live in decaying wood, in excrement, in decaying vegetation generally, or in the ground on the roots of plants. They are white or yellow in color, with a brown, horny head bearing prominent mandibles. They are much wrinkled and enlarged toward the posterior extremity, where they end in a smooth, obtusely-rounded, often discolored sac. They lie partly coiled up, the tip of the abdomen usually about touching the long, spiny legs.

The feeders in excrementitious matter are harmless, of course, but so much cannot be said for those that feed underground on the roots of plants. Grass lands are, as a rule, infested, and in some cases lawns are completely destroyed by the grubs which have sheared off every root at a certain depth. These are usually the larvæ of the "fig-eater." In some cases strawberry fields become infested and many plants are destroyed by the larvæ of "May-beetles" or "June-bugs." Corn and other plants are rarely attacked in our State, where, as a whole, white grub injury is not especially severe.

Remedial measures are largely unsatisfactory when once the grubs have established themselves. In lawns a herosene emulsion washed down by an abundance of water is tolerably satisfactory, but in the field this becomes impractical. A free use of the salty fertilizers, especially kainit, often serves as a palliative, but it is not at all reliable in all cases or on all soils.

Fall plowing turns out recently matured beetles and pupæ and lessens the adults for the ensuing year, and this is a good general practice where the grubs are abundant.

In rare cases, e. g. the "rose-chafer," it is the adult and not the larva that becomes injurious, and the methods of treatment must be modified accordingly.

The "rose chafer" appears in June, sometimes in immense swarms, and attacks flowers of a great variety and also leaves and blossoms of grapes, often completely ruining the crop. Because of their immense numbers poisons are comparatively ineffective, acting slowly, and the killed specimen being immediately replaced by a new arrival. On grapes two or three days will serve to ruin the crop, and while bordeaux mixture is a repellant to an extent, it must be supplemented by persistent gathering in umbrellas, &c., until the grapes are set or until the brunt of the attack is over.

"June bugs" occasionally attack fruit blossoms, eating through the stems and causing them to drop; recently they have done some injury to chestnut, and as these creatures fly after dark protection is less easy. In fact, except in a free use of lime and paris green we have no resource unless the plants are actually covered by a netting, which is, of course, impractical except on a very limited scale.

CANTHON Hoffm.

- C. ebenus* Say. Seashore, rare (Li). The species of this genus are the "tumble-bugs," sometimes seen rolling the pellets of dung in which their eggs are laid and which they bury.
- C. lecontei* Harold. Seashore, rare (Li, W), Da Costa, VII, 30 (W).
- C. vigilans* Lec. Atlantic County, rare (W), seashore, rare (Li), Weehawken, VI (Bt): occurs in dung.
- C. lævis* Dru. Common on dung throughout the State.
- C. chalcites* Hald. "New Jersey" (Lg): I have taken it commonly on Long Island.
- C. viridis* Beauv. Atlantic City, years ago (Li).

CHCERIDIUM Lap.

- C. histeroides* Web. Woodbury, Da Costa, VII, 7, 30, under horse droppings (W), Atco (Li): found in decaying fungi (Ulke).

COPRIS Geoffr.

- C. minutes* Dru. Found throughout the State, April to September, somewhat local and occasionally rather common: this as well as the other species is found in dung, and their presence is indicated by little heaps of fresh soil about or through the droppings in early morning.
- C. anaglypticus* Say. Common throughout the State, spring and fall.
- C. carolina* Linn. Throughout the State, May to July and again in September: it is our largest species of this series.

PHANÆUS Mac L.

- P. carnifex* Linn. Throughout the State, locally common: one of the few species attracted to human excrement; spring and fall.

ONTHOPHAGUS Latr.

- O. nuchicornis* Linn. Collingwood, IV, 23, Camden, VI, 7, and becoming more g. d. and common (W): except where otherwise mentioned the species feed in excrementitious matter.
- O. hecate* Panz. Recorded from all parts of the State, V-IX.
- O. janus* Panz. Common throughout the State, in decaying toadstools and other fungi.
 var *orpheus* Panz. Newfoundland (Lg).
 var *striatulus* Beauv. Brigantine beach, IX (Hn).
- O. tuberculifrons* Harold. Brigantine beach, IX (Hn), Clementon, VIII, 6 (W), Atco (Li), West Bergen (Bf).
- O. pennsylvanicus* Harold. Common throughout the State.

PSAMMODIUS Heer.

- P. nanus* DeGeer. Greenville, West Bergen, IV, 10, 26, V, 8 (Bf).

PLEUROPHORUS Muls.

- P. cæsus* Panz. G. d. rare (Bf), always at light (W), found in rich soil (Ulke).

RHYSEMUS Muls.

- R. scaber* Hald. Avalon, VIII, 3, Anglesea, VI, 26 (W), Atlantic City (Li), Brigantine, salt marshes, IX (Hn).

ATÆNIUS Harold.

- A. cognatus* Lec. Westville, I, 28 (W), Brigantine (Hn). These are all small species, mostly in excrement or decaying vegetation.
- A. wenzeli* Horn. Anglesea, Atlantic County (W), Brigantine, IX (Hn).
- A. strigatus* Horn. Brigantine beach, IX (Hn).
- A. gracilis* Mels. Westville, I, 28, Woodbury, VII, 30 (W), Brigantine, IX (Hn).
- A. imbricatus* Mels. Atlantic City, VI, 24, Anglesea, VII, 11, under drift (W), g. d. (Bf).
- A. socialis* Horn. Atlantic City, rare (W).

DIALYTES Harold.

- D. truncatus* Mels. Lake Hopatcong (Pm).

OXYOMUS Lap.

- O. porcatus* Fabr. Staten Island (Lg), Newark, g. d., V, 31 (Bf).

APHODIUS III.

- A. fossor* Linn. Hopatcong (Pm), West Bergen (Bf), Fort Lee, VI (Bt), Hudson County (Ll). An imported species which is spreading slowly: like most of the species, it occurs in excrement.
- A. fimetarius* Linn. Common all over the State.
- A. ruricola* Mels. G. d., rare (Li), Westville, IV, 26, Atco (W).
- A. granarius* Linn. Common all over the State.
- A. vittatus* Say. Da Costa, V, 21, Anglesea, VII, 12 (W), g. d. (Li), Newark district (Bf), common (Bt).
- A. inquinatus* Hbst. Common all over the State.
- A. rubeolus* Beauv. Da Costa, V, 21, Woodbury, VII, 30, Clementon, VIII, 6 (W), Camden, Landisville (Li), Newark, g. d. (Bf).
- A. stercorosus* Mels. Madison, V, 25 (Pr), Da Costa, VII, 30, g. d. (W), common (Li).
- A. bicolor* Say. Westville (Li), Newark (Bf).
- A. phalerioides* Horn. Lake Hopatcong (Pm): Cape May to Sandy Hook, along the coast, VII, VIII, IX.
- A. femoralis* Say. G. d., not rare (W, Li).
- A. parvus* Horn. Anglesea, VII, 11, at light (W).

BALBOCERAS Kirby.

- B. faretus* Fabr. Recorded from all sections of the State.
- B. lazarus* Fabr. Anglesea, VI, 21 (W), VII, 4 (Bf), Woodbury, VII, 30, g. d. (W), seashore (Li).

ODONTÆUS Kl.

- O. filicornis* Say. Atlantic City (Li), Ocean beach (Pr).
- O. cornigerus* Mels. "New Jersey" (Ll).

GEOTRUPES Latr.

- G. splendidus* Fabr. Hopatcong (Pm), in mushrooms (Bt), Madison (Pr), Caldwell (Cr), g. d., Merchantville, IX, 19 (W); really occurs throughout the State.
- G. semiopacus* Jek. Anglesea, VIII, 8 (W), Atlantic City (Li), Newark, Madison.
- G. egeriei* Germ. Clementon, III, 18, Woodbury, IV, 21, under fungus (W), Camden (Li).
- G. blackburnii* Fabr. Common throughout the State, III-X, in excrement of all kinds.
- G. balyi* Jek. Gloucester, VIII and IX (W), Westville (Li), Hopatcong (Pm), Ft. Lee (Sf), near decaying mushrooms in open places (Hn).

G. hornii Blanch. Somer's Point, mainland, near decaying mushrooms in open places (Hn), Staten Island, under mushrooms (Bt), Highlands, Hopatcong (Sf).

G. inutilis Horn. Lake Hopatcong (Pm).

TROX Fabr.

T. scabrosus Beauv. Throughout the State, recorded by all collectors, dates ranging from June to September. All the species in or under dried carcasses, hides, bones, &c.

T. asper Lec. Sandy Hook (Bt), Brigantine Beach, IX (Hn).

T. suberosus Fabr. Anglesea, V, 31 (W), Sandy Hook, VII (Bt), g. d. (W, Li), Lahaway.

T. tuberculatus DeG. Newark (Soc), Caldwell (Cr).

T. erinaceus Lec. Woodbury, VI, 6 (W), g. d. (W, Li), Hudson County (Li).

T. capillaris Say. Staten Island (Lg).

T. unistriatus Beauv. Hopatcong (Pm), Madison (Pr), g. d. (Li), everywhere (Bt).

T. sordidus Lec. Westville (Li), Madison (Pr).

T. foveicollis Harr. G. d., rare (Li).

T. terrestris Say. Hudson County (Li).

T. scaber Linn. Woodbury, Atlantic County, VI, 8, 24, Anglesea, VII, 11 (W), Newark, at light (Bf), Summit (U S Ag).

T. atrox Lec. "New Jersey" (Henshaw).

AMPHICOMA Latr.

A. lupina Lec. Jamesburg, VII, 4 (W), near Sandy Hook (Lœffler), seashore (Li), Hopatcong (Pm).

A. vulpina Hentz. Newark (Soc), Jamesburg, VII, 4, one female (Li).

HOPLIA Ill.

H. trifasciata Say. Seashore (Li), g. d. under leaves in March, flight, IV, 11 (W), West Bergen, IV, 24 (Bf), Ft. Lee (Bt).

H. trivialis Harold. Lucaston, IV, 24, g. d. in early spring (W), Gloucester, seashore (Li).

H. modesta Hald. Woodbury, IV, 29, g. d. flying around young shoots (W), seashore (Li), g. d. (Bf), Fort Lee, VI (Bt), Hopatcong (Pm).

DICHELONYCHA Kirby.

D. elongata Fabr. G. d. (W, Bf), Westville (Li), V, 18 (W), Ft. Lee, VI (Bt), Hopatcong (Pm), Newark.

D. subvittata Lec. Hopatcong (Pm).

D. fuscata Lec. Anglesea, V, 31 (W), Gloucester (Li), Long Island, VI (Bt).

D. albicollis Burm. Burlington County (W), Westville (Li), Fort Lee, VI (Bt).

SERICA MacL.

S. vespertina Gyll. Throughout the State May and June.

S. iricolor Say. DaCosta, Atco (Li), Atlantic County (W), Ft. Lee district (Bt), Ocean County, VI, on scrub oak.

S. sericea Ill Throughout the State, V and VI.

S. trociformis Burm. Atco, Clementon, DaCosta, V, 9-29 (W), Landisville (Li), Fort Lee district, VI (Bt), Ocean County, on scrub oak, V, 28.

MACRODACTYLUS Latr.

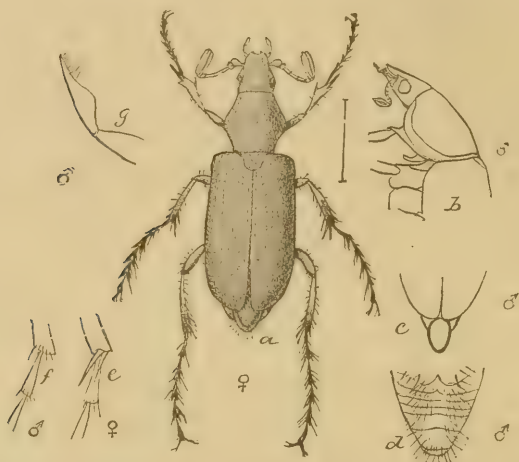


Fig. 118 —The "rose chafer": a, beetle, enlarged; b, to g, structural details.

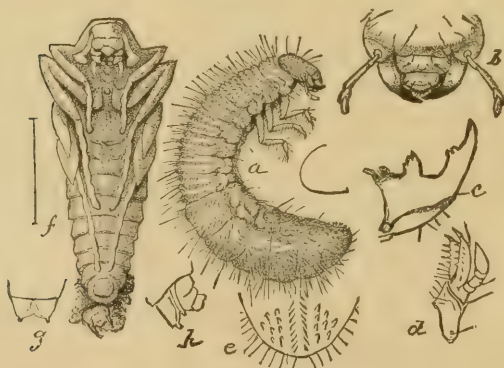


Fig. 119.—The "rose-chafer": a, larva; f, pupa; others refer to structural details, all enlarged.

M. subspinosus Fabr. The "Rose-bug": common throughout the State and in South Jersey destructive to grape and other fruits: often a pest on roses, and some seasons a nuisance on flowers of all kinds.

M. angustatus Beauv. Anglesea, VI and VII, on oak (W, Sm), Jamesburg, VII, 4 (Bt).

DILOTAXIS Kirby.

D. sordida Say. Lucaston, IV, 25, Anglesea, V, 31, Woodbury, VII, 30, at light (W), seashore (Li), West Bergen (Bf).

D. liberta Germ. Westville, V, 10, Anglesea, V, 30, VII, 22, Atlantic City, VI, 24, Woodbury, VII, 30 (W), Newark, Orange Mts (Bf), Madison (Pr).

D. tristis Kirby. Staten Island (Lg).

D. excavata Lec. Newark district (Bf), Hopatcong (Pm).

D. frondicola Say. "New Jersey" (Il).

D. truncatula Lec. Anglesea; found sweeping at night only (W).

D. bidentata Lec. Lake Hopatcong (Pm).

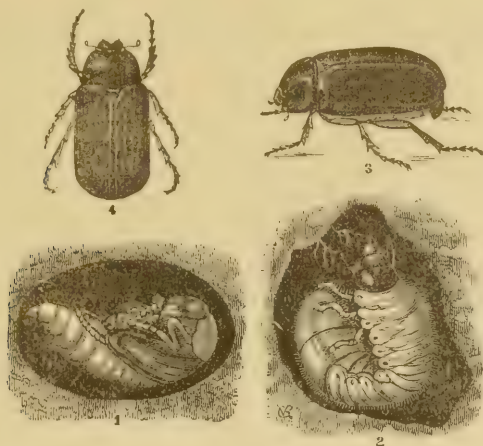


Fig. 120.—May beetle: 1, pupa in earthen cell; 2, larva or "white grub"; 3, adult from side; 4, same from top.

LACHNOSTERNA Hope.

L. glaberrima Blanch. Brigantine, IX, 10 (Hu), Anglesea, VII (Sz), "New Jersey" (U S N M). The members of this genus are the "May beetles" or "June bugs."

L. ephilida Say. Orange, Highlands, VI (Bt), g. d. (W, Li), Newark district.

L. clemens Horn. "New Jersey" (U S N M).

L. dispar Burm. Camden, Gloucester County (W).

L. gracilis Burm. Seashore (Li), Camden, Gloucester County (W), New Brunswick.

- L. gibbosa* Burm. Common throughout the State, though sometimes local.
- L. sub-pruinosa* Casey. Should yet be found in New Jersey.
- L. inversa* Horn. Ocean County, Lakewood, New Brunswick, single specimens only.
- L. micans* Knoch. Throughout the State and locally common, VI and VII.
- L. arcuata* Smith. Lahaway, V, 28, New Brunswick: probably through the State, locally.
- L. insperata* Smith. Snake Hill, apparently rare.
- L. dubia* Smith. Throughout the State, though sometimes local. Like most of the others of the genus, this species flies in the early evening and night, and is readily attracted to light. It feeds on the leaves of many trees, favoring oaks when obtainable. Flight begins in May and continues into July with this and most other species. They are sometimes injurious to young trees, and recently have proved destructive to grafted chestnut groves.
- L. fusca* Froehl. Perhaps the most common of the "June bugs" throughout the State.
- L. grandis* Smith. Camden, Gloucester County (W), Hopatcong (Pm), Jersey City, and probably rare throughout the State.
- L. fraterna* Harr., var. *cognata* Burm., var. *forsteri* Burm. Camden, Gloucester (W), Jersey City, New Brunswick and throughout the State, locally.
- L. nova* Smith. Long Island, New Brunswick, and probably quite generally distributed.
- L. luctuosa* Horn. Buena Vista, one female (Li).
- L. knochii* Gyll. Riverton (Castle), have taken a number of specimens, but always dead, in roads through pine woods (W).
- L. rugosa* Mels. Seashore (Li), Camden, Gloucester County (W), New Brunswick.
- L. hirsuta* Knoch. Occurs throughout the State, but is local and nowhere common.
- L. balia* Say. "New Jersey," without definite locality.
- L. hirticula* Knoch. Common everywhere.
- L. crenulata* Froehl. Camden, Gloucester County (W), Snake Hill (Bf), Jersey City, New Brunswick and scattered throughout the State.
- L. ilicis* Knoch. Throughout the State, not rarely.
- L. quercus* Knoch. Rare, isolated specimens from various localities.
- L. tristis* Fabr. The common small species, found everywhere in the State.
- L. barda* Horn. "New Jersey," two specimens (Sf).
- L. marginalis* Lec. Lake Hopatcong (Pm, Sf).

PHYTALUS Er.

- P. georgianus* Horn. Hammonton, VIII, 15, one specimen (Sz).

POLYPHYLLA Harr.

- P. variolosa* Hentz. Westville, VII, 9, Riverside (W), Hopatcong (Pm), Highlands (Sf), and all along shore in the wash-up

ANOMALA Kœppe.

- A. binotata* Gyll. Woodbury, III 16, Merchantville, Berlin, IV, 25, Westville, Angelsea, V, 28, 31 (W), Cumberland County, V, 10.
A. minuta Burm. Angelsea (Li, W).
A. undulata Mels. Angelsea, V, 30, a very distinct variety, Camden, Woodbury, VI, 6 (W), Orange Mts. (Bf), Hopatcong (Pm), Atlantic Highlands, VI (Ch), Ft. Lee.
A. lurida Fabr. Atlantic City (Castle).
A. lucicola Fabr. Common all over the State on grape and *Ampelopsis*, VI and VII.
A. oblivia Horn. DaCosta early in Spring on pines, Angelsea, Atlantic City, VI, 15, 24 (W), Landisville (Li), Sea Girt (Bf).
A. marginata Fabr. Sea-shore (Li), g. d. by beating hickory (W), said also to feed on the vine.

STRIGODERMA Burm.

- S. pygmæa* Fabr. Throughout south Jersey, V, VI, VII, on sweet potato and other *Convolvulacea* (W, Li, Bt, Bf, Sm), Madison (Pr).
S. arboricola Fabr. Throughout the State, more common southwardly VI and VII on flowers of *Rubus* and *Rosaceæ*: Angelsea, VII, on *Opuntia vulgaris* (W).

PELIDNOTA MacL.

- I. punctata* Linn. Common on grape throughout the State: larva in hickory and oak stumps (Bt).

COTALPA Burm.

- C. lanigera* Linn. Throughout the State, VI and VII, usually on willow or cottonwood, occasionally on oak: West Berlin, IV, 25 (W), Palisades in cop. VI, 7 (Lv).

CYCLOCEPHALA Latr.

- C. immaculata* Oliv. Seashore (Li), Sandy Hook (Bt), g. d. (W).
C. villosa Burm. Newark at light, one specimen (Bf), "New Jersey" (Bt).

CHALEPUS MacL.

- C. trachypygus* Burm. Throughout the State; but much more common along shore, attracted to light, VIII and IX.



Fig. 121.—*Cotalpa lanigera*.

LIGYRUS Burm.

L. gibbosus DeG. Throughout the State; but much more common along shore at light, VIII and IX.

L. relictus Say. As before, but much more common: at Anglesea the species is a nuisance at lights throughout the summer.

APHONUS Lec.

A. castaneus Mels. Atlantic City, VI, 15 (W), seashore (Bf), Madison (Pr), Anglesea, VII: larva in decaying stumps (Ulke).

XYLORYCTES Hope.

X. satyrus Fabr. Woodbury, VII, 30, Avalon, VIII, 18 (W), g. d. (Li), Newark g. d. (Bf), Fort Lee (Bt): the larva in roots of ash: This is the "Rhino beetle," with a great horn on top of its head, and it is one of the largest of our species.

STRATEGUS Hope.

S. antæus Fabr. DaCosta, in pine woods, Cape May County (W), Westville (Li), Long Branch (Bt), Newark (Soc), Lakewood: the larva in rotting wood. The beetle is very stout and broad, with three thoracic processes, which in the males are much longer and somewhat horn-like.

DYNASTES Kirby.

D. tityus Linn. Cape May, one specimen (W), Wildwood, one specimen (Satterthwaite).

ALLORHINA Burm.



Fig. 122.—*Allorhina nitida*: a, larva; b, pupa; c, adult; d-g, larval details.

A. nitida Linn. Throughout the State, locally common in sandy districts; flies like a bumble bee on bright hot days in July, occasionally in swarms: the larva is sometimes injurious in sod, eating off the roots so that the top can be rolled up like a carpet.

EUPHORIA Burm.

- E. areata* Fabr. Throughout the State, but very local and seasonal, IV, V and IX: my records run from Cape May to Hopatcong.
- E. sepulchralis* Fabr. Da Costa, VI, 3, and g. d. (W), Lakewood, Del. Water Gap (Bt), Hopatcong (Pm), throughout South Jersey in June
- E. melancholica* Gory. Oceanic (U S Ag).
- E. fulgida* Fabr. G. d. (Li), locally common (W), Greenwood Lake, V, 22, Palisades, VI, 6 (Lv), Hopatcong (Pm), Newark (Soc), Caldwell (Cr).
- E. herbacea* Oliv. Plainfield, VII, 11 (Lv), Staten Island, V (Bt), Westville (Li), g. d. (W), Lahaway, V, 28.
- E. indica* Linn. Throughout the State in spring and fall: beetles occasionally injurious to growing ears of corn, peaches and other fruits; larva not injurious, lives in manure and in rich earth (Ch).

CREMASTOCHILUS Knoch.

- C. variolosus* Kirby. Ft. Lee, Greenwood Lake, in ant hills (Bt), Westville (Li), Gloucester County (W), Madison (Pr), Orange Mts (Bf).
- C. canaliculatus* Kirby. Woodside, V, 1, rare (Bf).
- C. harrisii* Kirby. Clementon, V, 10, locally common in the early Spring on sand flats (W), Woodbury (Li), Morristown (Ds), Hopatcong (Pm).

OSMODERMA Knoch.

- O. eremicola* Knoch. Occurs throughout the State and locally not rare: larva in rotten trees.
- O. scabra* Beauv. With the preceding, and usually more common; larva as before.

GNORIMUS Lap.

- G. maculosus* Knoch. Greenwood Lake, Ft. Lee (Bt), Orange Mts (Bf), seashore (Li), g. d. (W).

TRICHIUS Fabr.

- T. piger* Fabr. Common throughout the State in July, prefers roses but found also on other flowers.
- T. affinis* Gory. Occurs with the preceding.
- T. delta* Forst. Williamstown, DaCosta, VII, 4, 16 (W).

VALGUS Scriba.

- V. squamiger* Beauv. Common throughout the State, IV, V, VI; breeds in decaying stumps.
- V. canaliculatus* Fabr. Hopatcong (Pm), Staten Island (Lg), Vineland (U S Ag.).

Family SPONDYLIDÆ

Oblong, brown, somewhat flattened beetles, with rather short antennæ; the tarsi 5-jointed but the fourth short and the third somewhat lobed. The thorax is almost square, well separated from the rest of the body and the mandibles are rather prominent, the head horizontal.

PARANDRA Latr.

P. brunnea Fabr. Occurs throughout the State, but rarely common, V, VI and VII: breeds in a variety of deciduous and coniferous trees (Ch).

Family CERAMBYCIDÆ.

These are the "long-horned beetles," so called because the antennæ or feelers are as long as or much longer than the body. The body is more or less cylindrical and elongate, though many of them are much flattened and only the thorax being without a lateral margin or suture in most instances carries out the idea of a cylinder. The front is vertical and the mandibles are usually stout and sharp pointed. The tarsi are apparently four-jointed only the third being deeply lobed.

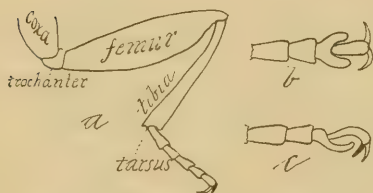


Fig. 123.—Leg structure in the Phytophaga; showing the characteristic tarsi.

The larvæ are wood-borers, though a few bore in herbaceous plants. They are more or less cylindrical, the joints well marked, the thoracic joints enlarged. They resemble the larvæ of the Buprestids in general shape but are not flattened, hence they are called the "round-headed" borers. They live chiefly in the solid or

heart wood and few of them bore in the sap-wood of living trees. On dead or dying trees or in stumps some species live between bark and wood, often in such numbers as to detach the bark completely.

Some species bore into live healthy wood, and these must usually be kept out by mechanical barriers

ORTHOSOMA Serv.

O. brunneum Forst. Not uncommon throughout the State, the larva in oak stumps: adults in July.

TRAGOSOMA Serv.

T. harrisii Lec. Newark, rare (Bf): found also along shore in the wash-up.

PRIONUS Geoff.

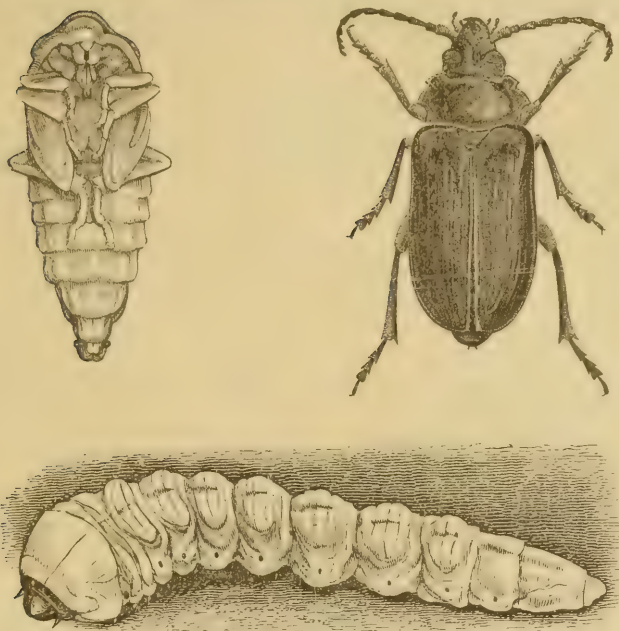


Fig. 124.—*Prionus laticollis* larva, pupa and adult.

P. laticollis Dru. Occurs throughout the State; the larva is a root-borer in a great variety of trees and shrubs, often causing severe injury to blackberry and grape: have also found it in apple and cherry. Where it attacks blackberry there is nothing to do but pull out the affected plant and kill the borer: it lives three years in this stage, and the plant is doomed at any rate.

P. popularis Dalm. Spring Lake (Ch), Landisville (Li), Cape May, VII (Sz), DaCosta in pine woods (W), Lahaway; the larva common in decaying pine logs.

SPHENOSTETHUS Hald.

S. taslei Buq. "New Jersey" (Horn), rare, not recently taken (Li).

ASEMUM Esch.

A. moestum Hald. Throughout the State, May and June; the larva on pine.

CRIOCEPHALUS Muls

C. agrestis Kirby. Chester (Dkn), Newark (Loeffler), Brigantine beach, IX (Hn), Anglesea, Lahaway, VII.

C. obsoletus Rand Newark, light (Bf), Woodbury, Atlantic City.

SMODICUM Hald.

S. cucujiforme Say. Orange, VI, not rare at light (Ch), Newark (Bf), Short Hills, VII (Bt), Camden, Gloucester County under oak bark (W), g. d. (Li) Lahaway, VI.

PHYSOCNEMUM Hald.

P. brevilineum Say. Atlantic, Cape May Co., (W), seashore (Li), Orange Mts (Bf), Ft. Lee, VII (Sf), Weehawken, VI, on elm (Bt): appears to be restricted to elm (Ch).

HYLOTRUPES Serv.

H. bajulus Linn. Atco, VI, 18 (W). g. d. on pine (Bt), Anglesea, VI, 20, Atlantic County, VI, 24, New Brunswick, VI, 6, and appears to occur throughout the State.

H. ligneus Fabr. DaCosta (Li), g. d., feeding on cedar (W), Newark district on cut cedar (Bf).

PHYMATODES Muls.

P. variabilis Fabr. Throughout the State on oak, VI, VII: the larva is one of the "bark slippers" often found in great numbers in cord-wood in Ocean County.

P. infuscatus Lec. Staten Island (Lg).

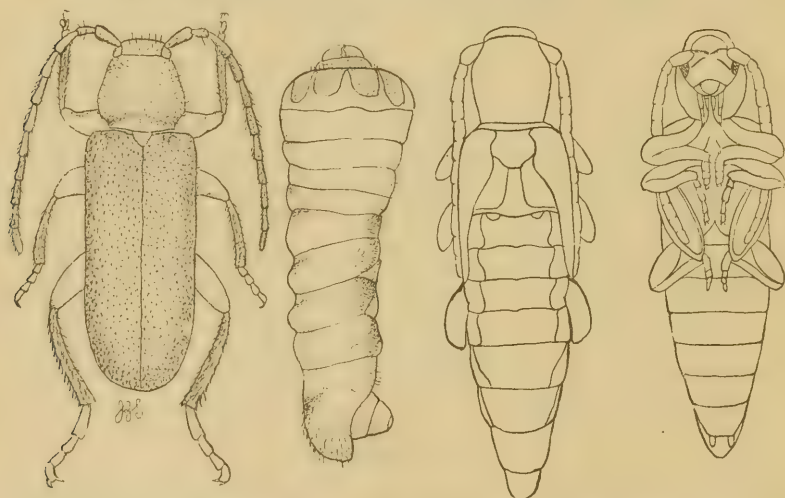


Fig. 125.—*Phymatodes amœnus*: larva, pupa and adult; much enlarged.

P. amœnus Say. Throughout the State, IV, V; the larva breeding in dead grape stems.

P. blandus Lec. Staten Island (Lg).

P. dimidiatus Kirby. Staten Island (Lg).

P. varius Fabr. Anglesea, V, 31 (W); not uncommon throughout the State, V and VI; the larva with that of *variabilis* in oak; I have bred both species from a single stick.

CALLIDIUM Fabr.

C. antennatum Newn. Westville, IV, 30, VIII, 9 (W), and common throughout the State, IV and V: on cut cedar (Bf), on pine (W), pine and cedar (Ch).

C. janthinum Lec. South Amboy, IV, on pine boughs (Ds).

C. æreum Newn. Newark, Orange Mts, light (Bf), Clifton, V, 30, bred from chestnut wood (Ch), New Brunswick.

OEME Newn.

O. rigida Say. Anglesea, VI, 12, and g. d. (W), seashore (Li), Newark district (Bf), Palisades (Lv), Fort Lee (Bt), Greenwood Lake (Sf). Sandy Hook, VII, Hunterdon Co., bred from red cedar, Jamesburg, VII, 4.

O. gracilis Lec. Orange, VI (Ch).

CHION Newn.

C. cinctus Dru. Occurs throughout the State, not commonly, May and June: the larva in hickory, oak and plum (Ch).

EBURIA Serv.

E. 4-geminata Say. Occurs throughout the State, somewhat rarely, in July: on oak and hickory (W).

ROMALEUM White.

R. simpliciolle Hald. Atlantic county, in pine woods, VIII and IX (W), seashore (Li), Lahaway.

R. atomarium Dru. Avalon, Anglesea, under bark, VI, 10 (Sm), VIII, 2 (W), at sugar, IX, 5 (Lv), Da Costa (Li).

R. rufulum Hald. Newark district (Bf), Merchantville, IV, 14, Woodbury, VII, 7 (W), Hudson County (Li), beaten from oak VII, VIII (W).

ELAPHIDION Serv.

E. mucronatum Fabr. Found throughout the State; affects trees of various sorts, as also grape vine; but does not amputate twigs after the manner of *E. villosum*.

E. incertum Newn. Orange Mts., rare (Bf).

E. inerme Newn. "New Jersey" (Lg).

E. villosum Fabr. Throughout the State: the larva in oak, hickory, apple, and a variety of other forest and fruit trees. It is known as the "oak pruner" and sometimes does notable injury to isolated shade trees. The only thing to do is to pick up systematically and burn all the fallen twigs and branches after every blow, thus destroying the contained larvæ.

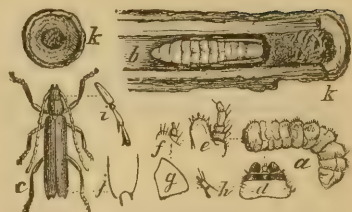


Fig. 126.—The "oak pruner": *a*, larva; *b*, pupa in its burrow; *c*, beetle; *k, k*, cut ends of twig; *d* to *i* structural details.

E. parallelum Newn. Atco, Camden, IV, 2, 10 (W): with the preceding, with similar habits, and may be the same species.

E. pumilum Newn. Staten Island (Lg).

E. subpubescens Lec. G. d., rare (Li).

E. aculeatum Lec. G. d., rare (W).

E. unicolor Rand. Berlin, VI, 25, Woodbury, VII, 30, Anglesea, common on scrub oak, VII (W), Short Hills (Bt), Woodside (Bf), Westville (Li): bred from red-bud (Leconte) and plum (Ch).

E. cinerascens Lec. Chester (Dkn).

TYLONOTUS Hald.

T. bimaculatus Hald. Camden, Gloucester Co., under bark of ash (W), Westville (Li), Ft. Lee (Joutel), Newark, New Brunswick.

HETERACHTHES Newn.

H. quadrimaculatus Newn. Orange Mts. (Bf), Palisades, VI (Lv), Fort Lee (Bt), Hudson County (Ll), Gloucester, Camden, g. d. (W, Li); all collectors report it on hickory.

H. ebenus Newn. Newark at light (Bf), Ft. Lee (Bt), Westville (Li), Somers Point, Brigantine, Camden, Woodbury, VI, 5, 8, 13, 26, Anglesea in numbers, washed up (W), VI, 20 (Sm), New Brunswick, VI.

CURIUS Newn.

C. dentatus Newn. Anglesea, rare on oak (W).

PHYTON Newn.

P. pallidum Say. Orange Mts., VII, 8 (Bf), Ft. Lee (Sf), Camden, VII, 6, Anglesea (W); breeds in hickory and red-bud (Ch).

OBRIMUM Serv.

O. rubrum Newn. Woodbury, VIII, 7, on ash (W), Newark on oak (Bf), Orange, VI (Ch), Ft. Lee (Sf).

O. rubidum Lec. Orange Mts., on ash (Bf), Philadelphia Neck (W).

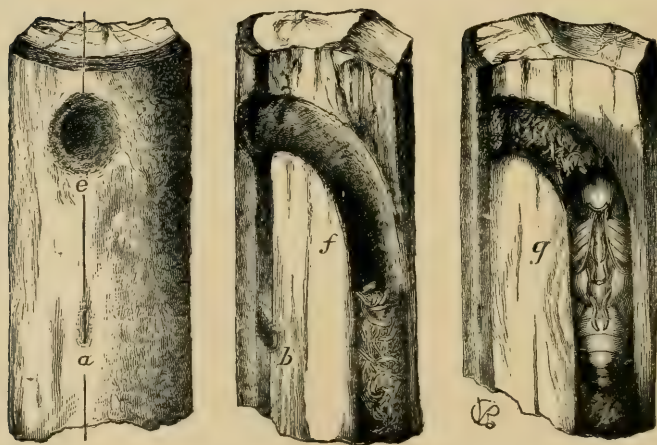


Fig. 127.—Work of the locust-borer, *Cyllene robinæ* in trunk and branches of locust tree.

Fig. 128.—Round-headed apple borer, *Saperda candida*: *a*, puncture in which egg is laid; *b*, same in section; *e*, hole from which beetle has emerged; *f*, same in section; *g*, pupa in its cell.

MOLORCHUS Fabr.

M. bimaculatus Say. Clementon, V, 9, Woodbury, VI, 4 (W), Palisades (Lv), Newark, g. d. (Bf), Anglesea, V, 30: develops in dead ash, dogwood, red-bud, hickory, walnut and maple (Ch).

RHOPALOPHORA Serv.

R. longipes Say. Seashore (Li); breeds in red-bud (Ch).

TRAGIDION Serv.

T. coquus Lec. G. d., more common southwardly (W), seashore (Li), Brigantine beach, IX, washed up (Hn), Caldwell (Cr), Lahaway, IX, 2, Cumberland County.

PURPURICENUS Serv.

P. humeralis Say. Camden, VII, 7, DaCosta, VI, 18, Anglesea, V, 30 (W), Newark district (Bf), Fort Lee on oak, VI (Bt), common in the wash-up all along the shore, Cape May to Sandy Hook.

P. axillaris Hald. DaCosta, VII, 3, on oak, rare (W), several, in different localities (Li), Ft. Lee (Sf).

BATYLE Thom.

B. suturalis Say. Throughout the State, VII and VIII.

STENOSPHEENUS Hald.

S. notatus Oliv. Throughout the State, but local: breeds in hickory.

CYLLENE Newm.

C. pictus Dru. Throughout the State, IV, V and VI; breeds in hickory, often rather injurious.

C. robiniae Forst. Throughout the State, VIII, IX and X: breeds in locust and makes it practically impossible to raise decent trees in most localities; but it seems to be lessening in numbers of late.

PLAGIONOTUS Muls.

P. speciosus Say. Orange Mts. (Bf), Madison (Pr), Snake Hill on oak, in which also it may breed (Ll); usual food-plant maple.

CALLOIDES Lec.

C. nobilis Say. Local throughout the State; found in the wash-up all along shore, Fort Lee on oak stumps (Bt), Orange, VI (Ch), Ft. Lee (Sf).

ARHOPALUS Serv.

A. fulminans Fabr. Throughout the State, not commonly: Fort Lee, VI (Bt), Lahaway, VII, 3.



Fig. 129.—*Plagionotus speciosus*.

XYLOTRECHUS Chev.

- X. colonus Fabr. Common throughout the State, V-VIII: lives in oak, maple, hickory, chestnut and other trees.
- X. sagittatus Germ. Anglesea, washed up, VII, 25, g. d., rare (W): feeds in pine (Ch).
- X. quadrimaculatus Hald. Brigantine, IX (Hn), South Camden, on black alder (W), Jamesburg (Muench).
- X. undulatus Say. Orange Mts. (Bf), whence also the variety *lunulatus* Kirby, is reported.

NEOCLYTUS Thom.

- N. scutellaris Oliv. Spring Lake, VIII (Ch), g. d. (W).
- N. luscus Fabr. G. d., rare (W).
- N. capræa Say. Newark (Soc), g. d., rare (W).
- N. erythrocephalus Fabr. Throughout the State, V, VI, VII: breeds in forest shade and fruit trees in great variety, as also in grape canes (Ch).

CLYTANTHUS Thom.

- C. ruricola Oliv. Palisades, on dead oak (Lv), Newfoundland, VII (Ds), Hopatcong (Pm), Orange Mts. (Bf).
- C. albofasciatus Lap. Camden, VI, 26, VII, 4 (W), Palisades, on dead oak (Lv), Ft. Lee (Joutel).

MICROCLYTUS Lec.

- M. gazellula Hald. Newark (Bf), South Jersey (W), rare.

CYRTOPHORUS Lec.

- C. verrucosus Oliv. Hopatcong (Pm), Caldwell (Cr), Palisades on dead oak (Lv), Newark district (Bf), g. d. (W): lives on chestnut, beech, linden, &c. (Ch).

TILLOMORPHA Blanch.

- T. geminata Hald. Orange Mts., V, VII (Bf), Staten Island (Lg), Hopatcong (Pm), Palisades, V, 24 (Lv), South Jersey (W): bred from sumach (Ulke).

EUDERCES Lec.

- E. picipes Fabr. Throughout the State, VI and VII, lives on linden, beech, chestnut, &c. (Ch).
- E. pini Oliv. Caldwell (Cr), Newark (Soc).

ATIMIA Hald.

- A. confusa Say. Pleasant Mills (Say), Eagle rock, all summer on cut cedar (Bf), Atco (Li), g. d., rare, in cedar (W).

DISTENIA Serv.

- D. undata* Oliv. Orange Mts., VII, off hickory (Bf), Westville (Li), Fort Lee (Bt), Hudson County (Li), Anglesea, VII, 22.

DESMOCERUS Serv.

- D. palliatus* Forst. Throughout the State on elder in July.

ENCYCLOPS Newn.

- E. cœruleus* Say. Orange Mts., sometimes common near Newark (Bf), Gloucester (Li).

RHAGIUM Fabr.

- R. lineatum* Oliv. Fort Lee, on pine (Bt), Newark district (Bf), Clementon, III, 18 (W), g. d. (W, Li), VI, VII: larva breeds under pine bark.

CENTRODERA Lec.

- C. decolorata* Harr. "New Jersey" (Sm).
C. picta Hald. Ft. Lee (Sf), Orange Mts., Woodside, V, 3, rare on dry hickory (Bf), Chester (Dkn), DaCosta, Anglesea (W).

TOXOTUS Serv.

- T. cylindricollis* Say. "New Jersey" (Horn), Ft. Lee (Joutel).

ACMÆOPS Lec.

- A. bivittata* Say. Fort Lee, VI (Bt), Newark (Soc), g. d. (Li).
A. directa Newn. Hopatcong (Pm), Greenwood Lake, Ft. Lee (Sf), Westville (Li), Orange Mts., g. d. (Bf).
A. discoidea Hald. Hopatcong (Pm), seashore (Li), Atlantic City (Castle), South Camden, VI (W).

GAUROTUS Lec.

- G. cyanipennis* Say. Orange Mts., Woodside, VI, 6 (Bf), Hopatcong (Pm), Tenafly, Ft. Lee, South Amboy (Bt), Caldwell (Cr), g. d. (W, Li), Newark.

STRANGALIA Serv.

- S. famelica* Newn. Throughout the State in July on flowers, of which *Spiræa* is a favorite.
S. acuminata Oliv. Hopatcong (Pm), Newark (Soc), Orange Mts. (Ch), Westville (Li).
S. luteicornis Fabr. Throughout the State, VI and VII, on flowers.
S. bicolor Swed. Delaware Water Gap to Anglesea, VI and VII.

BELLAMIRA Lec.

B. scalaris Say. "Point Breeze," Say's type locality.

TYPOCERUS Lec.

T. zebratus Fabr. Sea Girt, VIII (Bf), Landisville (Li), Da Costa, Atco, VI, 3 (W), Lahaway, V, 28, VI, 12.

T. velutinus Oliv. Common throughout the State in July.

T. lugubris Say. Fort Lee (Bt), New Jersey (Henshaw).

LEPTURA Serv.

L. emarginata Fabr. Irvington, VII, (Bf), Gloucester, VII, 10 (Green), Palisades in dead oak and maple (Lv), Ft. Lee on birch and oak (Bt), also on hickory.

L. deleta Lec. "New Jersey" (Li).

L. plebeja Rand. "New Jersey" (Horn), Caldwell (Cr).

L. subhamata Rand. "New Jersey" (Lg).

L. abdominalis Hald. Atlantic City (Castle), seashore, one specimen, female=*atrovittata* Bland (Li).

L. lineola Say. Throughout the State in June.

L. cruentata Hald. Da Costa, one specimen, dead (Li).

L. americana Hald. Eagle Rock in spring, one specimen (Bf).

L. hæmatites Newn. Westville (Li), Orange Mts., on dogwood blossoms (Bf), Ft. Lee (Sf).

L. nitens Forst.=*zebra* Oliv. Throughout the State, May and June, on chestnut (Bf, Ch), oak (Lv, Bt), and beech (Lv).

L. cordifera Oliv. Del. Water Gap, VII, 14 (Jn), Hopatcong (Pm), Orange Mts., once common (Bf).

L. rubrica Say. Throughout the State, May, June and July: on dead beech (Lv).

L. circumdata Oliv. Hopatcong (Pm), Orange Mts., on pussy willow (Bf), Atco (Li), Clementon, VI, 3 (Jn), Anglesea, V, 28 (W), Lahaway, VI, 1, 12, on Magnolia flowers.

L. vagans Oliv. Atco, Anglesea, DaCosta, VI, 24 (W), Sea Girt, VIII (Bf), Del. Water Gap, VII, 8, 15 (Jn): bred from butternut, hickory and birch (Ch).

L. proxima Say. Del. Water Gap, VII, 14 (Jn), Hopatcong (Pm), VI (Bt), Westville (Li).

L. octonotata Say. Ft. Lee, Hopatcong, VI (Bt), Orange Mts. (Bf).

L. vittata Germ. Throughout the State, June and July on flowers, more abundant in the more northern districts.

L. pubera Say. Orange Mts., VI, VII, on *Spiræa* (Bf), Madison, VI, 6 (Pr).

L. mutabilis Newn. Staten Island (Lg), Orange Mts. (Bf), Palisades on dead beech, IV, V (Lv).

L. quadricollis Lec. Staten Island (Lg).

CYRTINUS Lec.

- C. pygmæus* Hald. Recorded from all parts of the State and locally common; on dead oak twigs Cape May Court House, VI, 27 (W), Highlands on oak, hickory, locust and box elder (Ch), Anglesea, V, 28.

PSENOCORUS Lec.

- P. supernotatus* Say. Throughout the State, May and June, breeding in currant; locally common, though rarely injurious.



Fig. 130. — *Psenocorus supernotatus*: currant tip borer.

MONOHAMMUS Serv.

- M. titillator* Fabr. Occurs throughout the State on pine, June and July; a small form is taken in numbers at Anglesea in the wash-up.
- M. scutellatus* Say. Newark, one specimen (Bf), Chester (Dkn).
- M. confusor* Kirby. Fort Lee (Bt), Newark (Bf), Camden (Li), Atlantic and Cape May Counties, not rare.

DORCASHEMA Lec.

- D. alternatum* Say. Camden, Merchantville, VI, 7, 20, on Mulberry (W), g. d. (Li).
- D. nigrum* Say Hopatcong (Pm), Madison, VII, 24 (Pr), Orange Mts., VII (Bf), Caldwell (Cr), Westville (Li), g. d. on hickory (W).
- D. wildii* Uhler. Common on Osage orange near Philadelphia, and should certainly be found in New Jersey: kills all the black mulberry within several miles of Philadelphia (W)

HETCEMIS Hald.

- H. cinerea* Oliv. Collingwood, VI, 7 (W), g. d. (Li), Orange Mts., VII (Bf), on Mulberry.

CACOPLIA Lec.

- C. pullata* Hald. Fort Lee, VI (Bt), Madison, VII, 19 (Pr), Gloucester, Atlantic County, on oak (W).

GOES Lec.

- G. tigrina* De G. Hopatcong (Pm), Fort Lee (Bt), Snake Hill (Sf), Caldwell (Cr), on oak, in July (W).
- G. pulchra* Hald. Occurs throughout the State June and July on hickory: noted by all recorders.
- G. debilis* Lec. Merchantville, VI, 19, VI and VII, on oak (W), Da Costa (Li), Fort Lee (Bt), Orange Mts. (Bf), Madison, VIII, 12 (Pr), Greenwood Lake (Sf).

- G. tessellata* Hald. Da Costa, Atco, VII, 3, 10 on oak (W), Orange Mts., VII (Bf), Ft. Lee (Sf): Lahaway, larva at the base of oak saplings in June.
- G. pulverulentus* Hald. Gloucester, Atlantic County on beech, VI and VII (W), Camden (Li), Orange Mts., Bloomfield, VII (Bf), Ft. Lee (Joutel), New Brunswick, VII.

ACANTHODERES Serv.

- A. quadrigibbus* Say. Orange Mts., VIII, (Bf), Hopatcong (Pm), Chester (Dkn), Caldwell (Cr), Ft. Lee (Joutel): bred from several forest trees (Ch).
- A. decipiens* Hald. Palisades on dead hickory in May (Lv), Orange Mts. (Bf), Ft. Lee, So. Orange (Sf), Gloucester, Camden County (W), seashore (Li), Chester (Dkn).

LEPTOSTYLUS Lec.

- L. aculiferus* Say. Orange Mts., I, 2, at base of hickory, Newark, VII, on tulip tree (Bf), Madison, VIII, 4 (Pr), Woodbury, VII, 7, g. d. (W), seashore (Li).
- L. commixtus* Hald. Atlantic City, Brigantine, VI, 26 (W): what I take to be this species, reared from *Pinus inops* (Ch).
- L. biustus* Lec. Orange Mts. (Bf), Anglesea, VII (Sz).
- L. collaris* Hald. Hopatcong (Pm), Hudson County (Li), Highlands on chestnut (Ch).
- L. macula* Say. Clifton VI, breeds in nearly every kind of deciduous trees (Ch), Orange Mts. (Bf), Hopatcong (Pm), Chester (Dkn), Caldwell (Cr), g. d. (W, Li), Jamesburg, VII, 4.

LIOPUS Serv.

- L. crassulus* Lec. Madison (Pr).
- L. variegatus* Hald. Highlands, reared from huckleberry and box-elder (Ch), Newark, Sea Girt, Eagle Rock on locust (Bf), Palisades, VII (Lv), Atco (Li), g. d.)W).
- L. fascicularis* Harr. Newark (Soc).
- L. alpha* Say. Occurs commonly throughout the State, VI, VII; on sumach berries of previous year (Bt).
- L. cinereus* Lec. Throughout the State, VI, VII, VIII; on sumach in all stages (Bf).
- L. punctatus* Lec. Hopatcong (Pm), Eagle Rock (VI), 26 (Bf); reared from *Cornus florida* (Ch) and infests plum (Hopkins).

DECTES Lec.

- D. spinosus* Say. Throughout the State, VI, VII, VIII and IX; occurs on and breeds in the stems of rag-weed (W, Ch).

LEPTURGUS Bates.

- L. symmetricus* Hald. Palisades, VII, 2 (Lv), Ft. Lee (Sf), Hudson County (Ll), g. d. (Bf); reared from hackberry (Ch).
var. *angulatus* Lec. G. d., not common (W, Li), Ft. Lee (Sf).
L. signatus Lec. Palisades, VII, 10 (Lv), Ft. Lee (Sf), g. d., Newark district (Bf), Caldwell (Cr), : infests red-bud (Ch), and beech (Hopkins).
L. querci Fitch. Throughout the State, VI, VII, VIII: bred from oak, hickory and red-bud.
L. facetus Say. Recorded from all sections, VI and VII.

HYPERPLATYS Bates.

- H. aspersus* Say. Throughout the State, V, VI and VII.
H. maculatus Hald. Occurs with the preceding, and said by Mr. Schwarz to be identical with it: both are found on oak.
The variety *nigrellus* Hald., is found on Staten Island (Lg).

UROGRAPHIS Horn.

- U. fasciatus* DeG. Found throughout the State, V, VI, VII, VIII: reared from chestnut, oak and maple (Ch).

GRAPHISURUS Kirby.

- G. pusillus* Kirby. Newark (Soc): the occurrence of this species is doubted by Mr. Leng, who says it is northern and rare: Mr. Chittenden has found it under bark of *Pinus inops*, but gives no New Jersey locality.

ACANTHOCINUS Steph.

- A. obsoletus* Oliv. Seems to be generally distributed, but very rare; infests pine (Ch).
A. nodosus Fabr. Egg Harbor, IX, Anglesea, one specimen (W), very rare: breeds in pine (Ch).

POGONOCHERUS Latr.

- P. mixtus* Hald. Anglesea, Atlantic City, VI, 24, 26 (W), seashore (Li), Newark district, on dead swamp willow (Bf).
P. penicellatus Lec. Lake Hopatcong (Bt).

ECYRUS Lec.

- E. dasycerus* Lec. Throughout the State, VI and VII: breeds in red-bud (Ch), and hickory (Leconte).

EUPOGONIUS Lec.

- E. tomentosus* Hald. Orange Mts., on dry twigs (Bf), Atlantic City, Brigantine, VI, 24, 26, g. d. (W), Cape May Court House, VII (Sz), Anglesea, Hammonton : bred from apple twigs.
- E. vestitus* Say. G. d. (Li), infests *Cornus florida* (Ch), hickory (Riley) and walnut (Hpks).

ONCIDERES Serv.

- O. cingulata* Say. Palisades, VII (Lv), Fort Lee district, VI (Bt), Nutly (U S Ag), Camden (Li) ; girdles twigs of oak, hickory, persimmon and a number of fruit trees (Ch).

HIPPOPSIS Serv.

- H. lemniscata* Fabr. Camden, VII, 6, Merchantville, VI, 22 (W), Westville (Li), Bloomfield, VIII (Bf), Madison, VI, 80 (Pr), Anglesea, VII, 4 (Lv).

SAPERDA Fabr.

- S. obliqua* Say. Throughout the State, rarely ; breeding in black alder.
- S. calcarata* Say. Newark at light, rare (Bf), and occasional throughout the State : infests poplar and cottonwood, boring into living trees.
- S. mutica* Say. Gloucester, on willow (W), Caldwell (Cr).



Fig. 131.—Round-headed apple-borer, *Saperda candida*; a, larva; b, pupa; c, adult.

- S. candida* Fabr. Throughout the State, late May to August. The larva is the round-headed apple-borer which does great injury in orchards each year, especially in South Jersey : it also breeds in quince, which is even more injured than apple, and in *Crataegus*. The larvæ can be cut out when first noticed ; but the best practice is to protect the base of the tree by a wire netting kept at a distance of half an inch from the trunk on all sides. Heavy whitewash with paris green is also used, and indeed any mechanical protection that keeps the beetle from the bark a distance of from eighteen inches to two feet above the surface.

- S. fayi* Bland. Greenwood Lake, Delaware Water Gap (Bt).
S. vestita Say. Throughout the State in July : larva bores in and often seriously injures linden.
S. discoidea Fabr. Throughout the State, and locally not rare : the larva in hickory.
S. tridentata Oliv. Weehawken, Fort Lee, VI (Bt), Newark district, g. d., VI, on elm (Bf), Palisades, on elm, IV (Lv), Caldwell (Cr) ; the larva in elm.
S. lateralis Fabr. Throughout the State, May and June : the larva in hickory.
S. puncticollis Say. Throughout the State in June : larva in *Rhus radicans* and *toxicodendron*.
S. moesta Lec. Staten Island, on Willow (Lg).
S. concolor Lec. Newark district, wherever swamp willow occurs (Bf), Fort Lee (Bt).

OBBEREA Muls.

- O. bimaculata* Oliv. Hudson County (Ll), Hopatcong (Pm) : taken only on *Rubus* (Ch).
 var. *tripunctata* Fabr. Throughout the State, not rare.
 var. *basalis* Lec. Orange Mts., rare (Bt).
O. schaumii Lec. Newark (Soc).
O. ocellata Hald. Reported from all parts of the State in July.
O. tripunctata Swed. Throughout the State VI and VII.
 var. *myops* Hald. Orange Mts. (Bf), Newark (Loeffler), Anglesea (W).
 var. *mandarina* Fabr. South Jersey (W), Hopatcong (Pm), beaten from *Cornus alternifolia*, and also said by Riley to breed in poplar (Ch),
O. gracilis Fabr. Da Costa, VII, 5, Atco, Anglesea (W), Jamesburg, VII, 4 (Dietz).
O. ruficollis Fabr. Throughout the State, VI and VII, on sumach and sassafras.

TETROPS Steph.

- T. canescens* Lec. Gloucester County, one specimen on alder (W).

TETRAOPES Serv.

- T. canteriator* Drap. Throughout the State, but local.
T. tetraophthalmus Forst. Common everywhere July to September on milkweeds, on which also the preceding is found.

AMPHIONYCHA Lec.

- A. flammata* Newn. "New Jersey" (Lg), Orange Mts., rare (Bf).

DYSPHAGA Lec.

- D. tenuipes* Hald. Westville, two specimens (W); bred from red-bud (Ch), and recorded also from hickory and walnut.

Family CHRYSOMELIDÆ.

These are the "leaf beetles" which have the same tarsal structure as in the *Cerambycidae*, but have the antennæ much shorter, rarely as long as the body, the joints comparatively stouter and larger toward the tip. The species are rarely cylindrical, the thorax usually with a lateral margin or a distinct suture.

The larvæ are "slugs" or "grubs," usually also leaf-feeders, stout and chunky like the larva of the potato beetle; but some of them are leaf or root miners, and these are long and slender. In this family there are a considerable number of injurious species in both adult and larval stages, and as a general rule the arsenites are available against them. Yet there are so many modifications that no universally applicable suggestions can be made.

DONACIA Fabr.

- D. hirticollis* Kirby. Newark district (Bf). The species of this genus live on water plants.
- D. floridæ* Leng. Quick Pond near Branchville, VII, 30, on lily pads, abundantly (Lg).
- D. cincticornis* Newn. Staten Island on *Nymphæa* (Lg), Clementon, VIII, 6, Atco, VI, 3, DaCosta, VII, 30 (W).
- var *proxima* Kirby. Hudson County (Ll), Madison (Pr), Newark, Sea Girt (Bf), Gloucester, VI, 10, Delaware river front (W), Camden (Li), Ft. Lee, VI, 6 (Bt).
- D. palmata* Oliv. Hopatcong (Pm), Gloucester, VI, 10, Delaware river front, Woodbury, VI, 26, Westville, VII, 2, Jamesburg, VII, 4 (W), Fort Lee, VI, 6 (Bf).
- D. hypoleuca* Lac. Clementon, VII, 6 (Horn), Hopatcong (Pm), Spring Lake, VIII (Ch), New Brunswick.
- var. *rufescens* Lac. Clementon, VIII, 6, Anglesea, V, 31, VII, 12, washed up (W).
- D. piscatrix* Lac. Staten Island on *Nymphæa* and *Nuphar* (Lg), Clementon, VIII, 6, Westville, VII, 2 (W), g. d. (Li), Greenwood Lake (Bt).
- D. subtilis* Kunze. Staten Island on *Sparaganium*, &c. (Lg), Orange Mts. (Bf), Lake Hopatcong (Pm), Camden, III, 3, Atco, VI, 3, Clementon, VIII, 6 (W), Fort Lee, VI, 6 (Bt).
- var. *rugosa* Lec. Staten Island on Pickerel Weed (Lg), Lake Hopatcong (Pm), Spring Lake, IX, 9 (Ch).

- D. æqualis* Say. Newark (Bf), g. d., common, found all winter, hibernating (W).
- D. tuberculata* Lac. Staten Island, on *Sagittaria* (Lg), Sea Girt, Newark district (Bf), Westville, VII, 2, Anglesea, VII, 12, washed up (W), Jamesburg, VII, 4.
- D. distincta* Lec. Hudson Co. (Ll) Newark (Bf), Merchantville, IV, 2, Westville, V, 27 (W).
- var. *torosa* Lec. Camden and Gloucester Co. (W).
- D. pusilla* Say. "N. J." (Horn), one specimen, no exact locality (Li).
- D. femoralis* Kirby. Greenwood Lake (Bt).
- D. emarginata* Kirby. Snake Hill, V, 17 (Bf), Camden and Gloucester County (W).
- D. metallica* Ahrens. Lake Hopatcong (Pm),
- D. flavipes* Kirby. Westville, VI, 8, Gloucester, VI, 10 (W).
- D. rufa* Say. Westville, V, 23, Atco, VI, 12 (W), Greenwood Lake (Sf).

HÆMONIA Latr.

- H. nigricornis* Kirby. Westville (W), g. d. (Li): in low meadows.

ORSODACHNA Latr.

- O. atra* Ahr. Madison, VI, 6 (Pr), Newark, g. d. (Bf), Ft. Lee (Bt); feeds on bloom of willow and various fruit trees (Ch), on the catkins of poplar, blossoms of spice bush and other early bloom: have taken it in mid-April on Long Island.

ZEUGOPHORA Kunze.

- Z. consanguinea* Cr. Newark (Bf), Madison, VIII, 6 (Pr).
- Z. varians* Cr. Orange Mts., rare (Bf), on poplar in June (Hn).

SYNETA Esch.

- S. ferruginea* Germ. G. d. (W), Hudson Co. (Ll), Newark district (Bf), Madison, V, 10 (Pr), Palisades, VI, 5 (Lv), Ft. Lee, VI (Bt), Greenwood Lake (Sf).

LEMA Fabr.

- L. brunneicollis* Lac. Hudson Co. (Ll), Newark (Bf), Palisades, VI, 7 (Lv), Ft. Lee on thistle (Bt).
- L. collaris* Say. Newark, g. d., rare on thistle (Bf).
- L. solani* Fab. Anglesea, one spec. (W).
- L. trilineata* Oliv. The "old fashioned potato beetle;" occurs throughout the State, V-VIII, sometimes commonly, but checked by the ordinary applications made against the "Colorado" beetle.

CRIO CERIS Geoff.

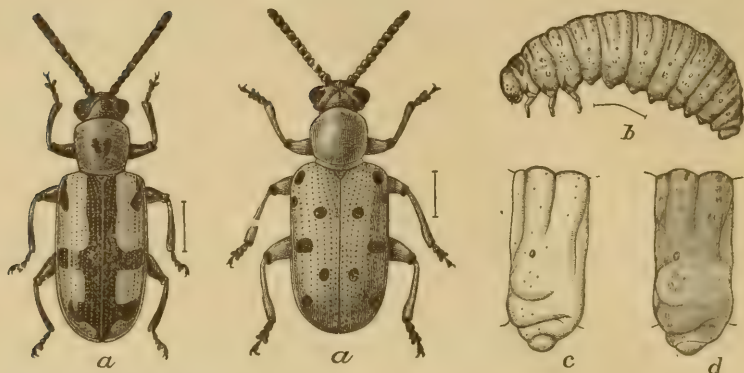


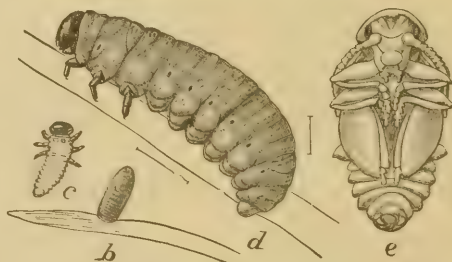
Fig. 132.—The common asparagus beetle.

Fig. 133.—The 12-spotted asparagus beetle: *a*, adult; *b*, larva; *c*, *d*, segments of same: all enlarged.

C. asparagi Linn. Common wherever asparagus is cultivated, throughout the season and often injurious: an imported species.

If the larvæ occur on young plants brush them to the ground on the middle of a hot sunny day. On larger plants apply fresh dry-slaked lime early, so as to reach them when they are a little moist. In bearing fields let trap shoots grow until covered with eggs and then destroy them: keep this up throughout the cutting season and this will reduce the other broods. Destroy all volunteer asparagus.

C. 12-punctata Linn. Also an introduced species which has been working up from Maryland and has now reached the red-shale line across the State: it is also a feeder on asparagus throughout the season, though not as yet so abundant as the preceding. The same measures may be employed against it.

Fig. 134.—Common asparagus beetle: *b*, egg; *c*, young larva; *d*, full grown slug or larva; *e*, pupa; all enlarged.

ANOMCEA Lac.

A. laticlavata Forst. Merchantville. Berlin, VI, 11, 25 (W). Woodside, Orange Mts., g. d. (Bf), Ft. Lee on *Desmodium* (Bt), adult feeds freely on bush clover and locust (Ch).

COSCINOPTERA Lec.

C. dominicana Fabr. Newark, g. d (Bf), Hudson Co. (Ll), DaCosta (Li), Clementon (W), Ft. Lee (Bt), on Sumach (Ch).

BABIA Chevr.

- B. quadriguttata* Oliv. Greenwood Lake to Anglesea, June to August; on *Ceanothus americanus* (Ch).

SAXINIS Lac.

- S. omogera* Lac. Cape May C. H., V, 4, Atco, VI, 17, DaCosta, VII, 15 (W), So. Jersey (Li), Orange Mts., VI, 26 (Bf), Ft. Lee (Sf).

CHLAMYS Knoch.

- C. plicata* Fabr. — *polycocca* Lac. Occurs throughout the State, though nowhere common, May: on hazel (Bt), *Rubus*, *Platanus*, alder, oak, &c. (Ch), huckleberry (Hn).
C. foveolata Knoch. Atco, DaCosta (W).

EXEMA Lac.

- E. conspersa* Mann. = *gibber* Oliv. Occurs throughout the State, not uncommonly, June and July.

BASSAREUS Hald.

- B. congestus* Hald. Anglesea, VII, 13, 23 (W, Sm), Jamesburg, VII, 4, 15 (Sm), on *Clethra* (Lg), Ft. Lee, VI, on Alder (Bt): at Anglesea a small variety occurs (Li).
B. formosus Mels. DaCosta (W), Hudson Co. (Ll), Orange Mts. (Bf), in June (Ch), Lahaway, V, 28: on *Sambucus* in June (Hn).
 var. *sulfuripennis* Mels. Sparta, VII (Ds).
B. detritus Oliv. Clifton, May, on *Ceanothus americanus* (Ch).
B. mammifer Newm. G. d. (W), Orange Mts., VI, 26 (Bf), Madison, VII, 28 (Pr), Ft. Lee (Bt), on *Ceanothus americanus* (Ch), hickory and hazel (Hn).
 var. *sellatus* Suffr. Anglesea (W).
 var. *luteipennis* Mels. Anglesea (W), Hudson Co. (Ll), Ft. Lee (Bt).
B. lituratus Fabr. Throughout the State, V-VII.
 var. *recurvus* Say. Atco, DaCosta, VI, 4, 12, Westville, VII, 2 (W).
 var. *lativittis* Germ. Westville, DaCosta, VI, 6, 18 (W), g. d., New-ark, VI, 11 (Bf), Anglesea, V, 28.

CRYPTOCEPHALUS Geoff.

- C. notatus* Fabr. G. d. (W).
 var. *4-maculatus* Say. Recorded from all parts of the State, V, 14—VI, 18; Ft. Lee, on oak (Bt), on *Ceanothus americanus* (Ch), on *Rubus* (Hn).
 var. *notatus* Fabr. G. d. (W).

C. quadruplex Newm. Madison (Pr), Hudson Co. (Ll), Jamesburg, VII, 4 (Lv), Ft. Lee (Bt), on elm (Hn), Anglesea, V, 28, Jamesburg, Lahaway, South River, VII, 8.

var. 4-guttulus Suffr. Atco, V, 29, Anglesea, V, 30 (W), Staten Island (Lg), Lake Hopatcong (Pm).

C. guttulatus Oliv. Cape May C. H., V, 27, Merchantville, VII, 15, g. d. (W), Orange Mts. (Bf), Ft. Lee (Sf), Jamesburg, VII, 4 (Lv), VI, 15 (Sm); on white oak (Hn).

C. leucomelas Suffr. South Camden, on poplar (W).

C. venustus Fabr. Common throughout the State, June to August: on *Ceanothus americanus* and, according to J. D. Lyons, on potato and other garden plants (Ch).

The varieties *ornatus* Fabr., *cinctipennis* Rand, and *simplex* Hald., are recorded as occurring with the type.

C. insertus Hald. Throughout South Jersey, VI and VII (W), Newark (Pf).

C. calidus Suffr. Hudson County (Ll), Ft. Lee (B).

C. gibbicollis Hald. Anglesea, DaCosta, VII, 3 (W).

C. trivittatus Oliv. Da Costa, Atco, VIII, 10, IX, 11 (W), Ft. Lee (Bt).

C. mutabilis Mels. Anglesea (W), South Orange, VII, 4, 26 (Lv), Ft. Lee (Sf), g. d., Newark district (Bf), on *Ceanothus americanus* (Ch), hazel, *Viburnum* and oak sprouts (Hn).

C. pumilus Hald. Staten Island (Lg).

C. badius Suffr. Caldwell (Cr).

C. schreibersii Suffr. Orange Mts., Woodside (Bf), Hudson County (Ll), on pine leaves (Ch, Ulke); New Brunswick.

C. tinctus Lec. Staten Island (Lg).

C. striatulus Lec. Hudson Co. (Ll), Orange Mts. (Bf), Ft. Lee (Bt).

PACHYBRACHYS Chev.

P. morosus Hald. Cape May C. H., Da Costa. Atco, VI, 2 (W).

P. litigiosus Suffr. Anglesea, Da Costa, VI, 3, West Berlin, VI, 25 (W).

P. abdominalis Say. "New Jersey" (W).

P. othonus Say. Greenwood Lake, VI, 21 (Lv), Hudson Co. (Ll), Newark district, g. d. (Bf), Ft. Lee (Bt), on *Ceanothus americanus* (Ch), Orange Mts. common.

P. viduatus Fabr. "New Jersey" (W).

P. trinotatus Mels. Anglesea, VII, 12 (W), Hudson County (Ll), Newark district, g. d. (Bf), Ft. Lee, VI, on *Baptisia tinctoria* (Bt), on *Ceanothus americanus* (Ch).

P. intricatus Suffr. Occurs throughout the State, V, VI and VII.

P. tridens Mels. Clementon, Atco, VI, 2, on poison ivy when in bloom (W), Newark district, g. d. (Bf), Hudson County (Ll), Ft. Lee on *Rhus toxicodendron* (Bt), on sumach and *Ceanothus americanus* (Ch), Anglesea, VI, 20.

- P. carbonarius* Hald. Throughout South Jersey, V and VI (W), Woodside, Snake Hill, V, 31 (Bf), Staten Island (Lg).
- P. luridus* Fabr. Hudson County (Ll), Fort Lee (Bt), Clifton, V (Ch).
- P. atomarius* Mels. Throughout the State, VI, VII, VIII; on *Ceanothus*.
- P. femoratus* Oliv. Anglesea (W), Newark (Soc).
- P. infaustus* Hald. South Jersey, g. d., V and VI (W) Orange Mts. (Bf), Madison (Pr), Staten Island (Lg), Anglesea, V, 28, Lahaway, VI, 1.
- P. hepaticus* Mels. Anglesea, VII, 12 (W), Woodside, rare (Bf).
- P. subfasciatus* Hald. Palisades, V, 24 (Lv), Ft. Lee (Sf), Clifton, V, Orange, VI (Ch), DaCosta, VI, 12 (W).
- P. dilatatus* Suffr. Orange Mts. (Bf), "New Jersey" (Horn), Newark.

MONACHUS Chevr.

- M. ater* Hald. Orange Mts. (Bf), "New Jersey" (Henshaw), Ft. Lee, not rare (Bt), Jamesburg, V, VI, 16, VIII, 15.
- M. saponatus* Fabr. Woodbury, VI, 23, Westville, VII, 19, Clementon, VIII, 6 (W), Staten Island (Lg).

DIACHUS Lec.

- D. auratus* Lec. Throughout the State, VI and VII.
- D. levis* Hald. Jamesburg (Lg).
- D. squalens* Suffr. Jamesburg, VII, 15.

TRIACHUS Lec.

- T. atomus* Suffr. Atco, V, 29, Berlin, VI, 26, DaCosta, VII, 5 (W), Anglesea, VII, 12 (Sz), V, 28 (Sm), So. Orange (Sf), Hopatcong (Pm), on *Myrica cerifera* in July (Ch), on huckleberry in June (Hn), Jamesburg, VII, 15.
- T. cerinus* Lec. "New Jersey" (Lg), Snake Hill, one specimen (Sf), Sandy Hook (Bt), g. d. (Li).
- T. postremus* Lec. DaCosta, Atco, VI, 4, Jamesburg, VII, 4 (W).

ADOXUS Kirby.

- A. obscurus* Linn., var. *vitis* Fabr. Madison (Pr), Orange Mts., V, 30 (W), Ft. Lee (Bt), feeds on grape.

FIDIA Baly.

- F. viticida* Walsh.=*murina* Cr. DaCosta, Westville, Merchantville, Glassboro, VII, 6-30 (W), Chester (Dn), Staten Island (Lg): occurs throughout the State, on grape, which is sometimes slightly injured; also on *Ampelopsis*.
- T. longipes* Mels. Caldwell (Cr), New Brunswick; also on grape and *Ampelopsis*, sometimes abundantly.

XANTHONIA Baly.

- X. 10-notata Say. Westville, V, 9, Berlin, VI, 25, DaCosta, VII, (W), Greenwood Lake, VI, 21, Hemlock Falls, VII, 4 (Lv), Anglesea, VIII; common throughout the State on oak.
- X. villosula Mels.=stevensii Baly. Berlin, VI, 25, DaCosta, VIII, 14 (W), Newark district generally (Bf), and throughout the State on oak and hazel.

GLYPTOSCELIS Lec.

- G. pubescens Fabr. Generally distributed (W), Ft. Lee (Bt), Greenwood Lake (Sf), Burlington County, New Brunswick; on spruce (Hn), and pine (Ch).
- G. barbata Say. Lucaston, IV, 25, Westville, V, 9. Da Costa on hickory (W), Ft. Lee (Sf), Madison (Pr), Newark district on hickory (Bf).

GRAPHOPS Lec.

- G. pubescens Mels. Caldwell (Cr), Hudson Co. (Ll), Orange Mts. (Bf), Ft. Lee (Bt), South Jersey, V, 30, Lahaway, VI, 1, South River, VII, 23, Burlington Co., VIII, 7; on evening primrose (Hn).
- G. curtipennis Mels. Anglesea, V, 28, Lahaway on cranberry bogs, V, 20, Atco, VI, 4, South Jersey, VI, 10, Newark.
- G. marcassitus Cr. Hopatcong (Pm), Ft. Lee, Snake Hill (Sf), Newark.
- G. nebulosus Lec. Generally distributed (W), Ocean Co., rare: the larva in roots of strawberry and sometimes injurious.

TYPOPHORUS Er.

- T. viridicyaneus Cr. Northern N. J., taken by Dietz (W).
- T. canellus Fabr. Throughout the State, May to October on a great variety of trees and plants: larva on strawberry, blackberry, raspberry, &c.
- var. aterrimus Oliv. Anglesea, along the coast, VI and VII (W, Sm), Greenwood Lake, Ft. Lee (Bt)
- var. gilvipes Horn. Cape May C. H., Atco, VI, 4, Westville, VIII, 13 (W), Arlington, New Brunswick, VII, 20, Ocean Co., Jamesburg, VII, 15.
- var. thoracicus Mels. Generally distributed, Camden, XII, 12 (W).
- var. 4-notatus Say. Atco, VI, 4, Gloucester, VII, 16, g. d. (W), Ft. Lee, VII, 31 (Bt), Ocean and Cumberland Counties in May.
- var. sellatus Horn. Anglesea, Gloucester, VII, 12, 16, g. d. (W), Ocean Co., V, 28, Jamesburg, VII, 15.
- var. vittatus Horn. Atco, V, 18, Longport, VI, 11 (W).
- var. 4-guttatus Lec. Ocean Co., V, 28, VI, 10.
- var. sexnotatus Say. Da Costa, Cape May C. H., Atco, V, 26 (W), Bayside, IX, 21.
- var. pumilus Lec. Cape May C. H., V, 27, Anglesea, VII, 11, Atco, VIII, 26 (W), Lahaway, V, 20.

METACHROMA Lec.

- M. quercata* Fabr. Throughout South Jersey, on scrub oak, V-VII (W, Sm), Lake Hopatcong (Pm), Orange Mts.
- M. pallida* Say. Avalon, VII, 4 (W), Anglesea, VII (Sz), Jamesburg, VII, 15, Ocean Co.; on oak.
- M. lævicolle* Cr. Buena Vista, VII, 11 (Li), Sandy Hook (Bt), Anglesea, VII, 12, Jamesburg, VII, 15: on oak.

CHRYSOCHUS Redt.

- C. auratus* Fabr. Locally common, V, and VII on milkweeds (*Asclepias*) and *Apocynum*: larvæ feeding about the roots (Ch).

TYMNES Chap.

- T. tricolor* Fabr. Camden Co., VI, 6-11 (W), Hopatcong (Pm), Palisades, VI, 7, Plainfield, VII, 11 (Lv), Newark district, common (Bf), New Brunswick, VII, 7, and local throughout the State: on chestnut, hickory, etc. (Hn).
- T. metasternalis* Cr. Anglesea, VII, 23 (W, Sm), Staten Island; on *Cratægus* (Hn).

COLASPIS Fabr.

- C. favosa* Say. Generally distributed (Li).
- C. brunnea* Fabr.=*flavida* Say. Plainfield, VII, 11 (Lv), Staten Island (Lg), Newark district (Bf), Jamesburg, VI, 10, VII, 15, Anglesea, VII, 12. Feeds on foliage of grape, strawberry, potatoes, beans, &c., the larva on roots of grape, but not injurious in our State.
- var. *costipennis* Cr. Clementon, DaCosta, VI, 3, 12 (W), Jamesburg, VI, 16, VII, 1, on *Clethra alnifolia*.

RHABDOPTERUS Lef.

- R. picipes* Oliv.=*prætextata* Say. Newark, VII, 4, DaCosta, VI, 30, Atco, VII, 17 (W), g. d. (Li), Staten Island (Lg), Ft. Lee (Bt); feeds on the myrtle and basswood (Horn), grape (Hn).

NODONOTA Lef.

- N. tristis* Oliv. Throughout the State in July; on *Lespedeza*, *Ceanothus*, &c. (Hn); attacks plum, cherry and some other fruit trees (Ch).
- N. clypealis* Horn. Westville (W), Atl. Highlands, VII, 11 (Lv), Newark (Bf), Ft. Lee (Sf), South Jersey, VI, 2.
- N. convexa* Say. Westville (W); on *Ambrosia trifida*, VII and VIII (Hn).
- N. puncticollis* Say. Throughout the State in July—our most abundant species; on roses (Hn), also blackberry, raspberry and red clover (Ch).

CHRYSDINA Baly.

C. globosa Oliv. Camden, IV, 8, Atco, V, 29 (W), Hudson Co. (Ll), Newark district (Bf), Orange Mts., and throughout the State.

PRASOCURIS Latr.

P. vittata Oliv. = *varipes* Lec. Occurs throughout the State, IV-VII, and sometimes locally common.

P. phellandri Linn. Lake Hopatcong (Pm).

LABIODERMA Chev.

L. clivcollis Kirby. Collingwood, VI, 20, Westville, Clementon, VIII, 5, 13 (W), Hopatcong (Pm), Anglesea, VI, 20, IX, 5, Middlesex Co., VII, and g. d. on milkweeds.

LEPTINOTARSA Stål = DORYPHORA.



Fig. 135.—The 10-lined potato beetle; *a, a'*, egg patches; *b, b'*, larvæ in different stages of growth; *c*, pupa; *d*, beetle; *e*, its elytra, enlarged.

L. 10-lineata Say. The "potato beetle"; common everywhere from early Spring to late fall on *Solanaceæ* of all kinds; but especially destructive to potatoes and egg-plants. Persistent and frequent treatment with the arsenites is necessary to keep this species in check.

ZYGOGRAMMA Chevr.

Z. suturalis Fab. Woodbury, IV, 21, Atco, VI, 4, Gloucester, VII, 15 (W), Palisades, VII, 26 (Lv), Chester (Dn), Fort Lee (Bt); feeds on Ambrosia (Hn), Lahaway, V, 20, Jamesburg, Anglesea, New Brunswick, VII, 12, 15, 20, and g. d. throughout the State.

CALLIGRAPHA Er. = CHRYSOMELA.

- C. lunata* Fabr. Caldwell (Cr), Newark, g. d., but rare (Bf), Greenwood Lake (Sf), "New Jersey" (W), on rose (Bt).
- C. similis* Rog. Atco, VIII, 20 (W), Fort Lee, VI (Bt), Spring Lake on *Ambrosia artemesifolia* (Ds), South Jersey, V, 20, New Brunswick, VII, 20 and g. d. through the State.
- C. elegans* Oliv. Gloucester, VII, 26 (W), Newark district (Bf), Hopatcong (Pm), Fort Lee, VI, on *Ambrosia* (Bt), also on *Bidens* (Ch), Lahaway on Cranberry bogs, V, 28.
- C. scalaris* Lec. Gloucester, VIII, 16 (W), Greenwood Lake, V, 20 (Lv), Caldwell (Cr), Newark, g. d. (Bf), Fort Lee (Bt).
- C. philadelphica* Linn. Westville, IV, 22, Atco, Clementon, Merchantville, V, 17, 29 (W), Orange Mts., VI, 4 (Bf), Caldwell (Cr), Fort Lee (Bt), Lahaway, V-VII on witch hazel.
- var. *spirææ* Say. With the type and locally replacing it: on *Spiræa opulifolia* (Hn).
- C. multipunctata* Say. Caldwell (Cr), Orange Mts. (Bf), Greenwood Lake, VI, 21 (Lv), Chester (Dn), Fort Lee, Milburn (Bt), Lahaway, VI, 10.
- C. bigsbyana* Kirby. With the preceding, but more rare: on maple, willow and alder (Hn).

PLAGIODERA Redt.

- P. viridis* Say. Camden (W), Orange Mts.
- P. cochleariæ* Gyll. Hopatcong (Pm).

GASTROIDEA Hope.

- G. polygoni* Linn. Common throughout the State, June to September. It is one of the most widely distributed forms, occurring even in cities and sometimes on window plants: feeds on *Polygonum* (Ch).
- G. cyanea* Mels. Orange Mts., and elsewhere throughout the State; feeds on *Rumex* in July (Hn).

LINA Megerle.

- L. lapponica* Linn. G. d. (W), Orange Mts., on alder (Bf), also on willow (Hn).
- L. scripta* Fabr. Anglesea, VI, 15, DaCosta, VII, 15, g. d. (W), Caldwell (Cr), Greenwood Lake, VI, 21 (Lv), Newark district, g. d. (Bf), New Brunswick, on Willow, VII, 20, and common throughout the State on willow and poplar.
- L. obsoleta* Say. Newark, in many varieties (Bf), Greenwood Lake, VI, 21 (Lv).

PHYLLODECTA Kirby.

- P. vulgatissima* Linn. Madison (Pr), Orange Mts. (Bf, Sm), Hopatcong (Pm), Ft. Lee, VIII and IX, on willow (Bt) and poplar (Ch).

TRIRHABDA Lec.

T. tomentosa Linn. Brigantine, VII, 25, Anglesea, VII, 12 (W), IX, 6 (Sm), Atlantic City and elsewhere along shore, on *Solidago*.

T. virgata Lec. Hopatcong (Pm), Sandy Hook, VIII, IX (Bt).

T. canadensis Kirby. Have taken this at all shore points in July, and the species occurs locally throughout the State; the larva on *Solidago*.

T. luteocincta Lec. N. J. coast near Long Branch (Horn).

GALERUCELLA Cr.

G. americana Fabr. = *conferta* Lec. Atco, VI, 4, Newark, VII, 4 (W), Orange Mts. (Bf), Greenwood Lake, VI, 21 (Lv), Madison (Pr), Ft. Lee, VI (Bt), Jamesburg, VI, and g. d. throughout the State; lives on *Solidago* (Ch).

G. sexvittata Lee. Anglesea, VII, 23.

G. cavicollis Lec. Atco, VI, 4, Anglesea (W), eastern N. J. (Dietz). Have found this feeding abundantly on peach foliage in Pennsylvania, but never observed it in N. J.: it also feeds on plum and cherry.



Fig. 136.—The elm-leaf beetle; *a*, *a*, egg patches on leaves; *b*, larvae feeding; *c*, adult; all natural size; *e*, egg mass; *f*, surface of egg; *g*, larva; *h*, *i*, larval details; *j*, pupa; *k*, beetle; *l*, surface of elytra; all enlarged.

- G. rufosanguinea* Say. G. d., common (W), Newark (Bf), Palisades, VI, 7 (Lv), Fort Lee district, May (Bt), feeds on *Azalea* (Hn).
- G. integra* Lec. Anglesea, VIII, 13 (W), Caldwell (Cr).
- G. notulata* Fabr. Newark (Dkn), Spring Lake, VIII (Ch), Fort Lee (Bt), Anglesea : larva on *Ambrosia* in August (Hn).
- G. notata* Fab. Atco, IX, 11, and g. d (W), Caldwell (Cr), Newark, g. d. (Bf), Fort Lee (Bt); in all stages on *Eupatorium perfoliatum* (Ch).
- G. nymphææ* Linn. = *sagittariæ* Gyll. Occurs throughout the State, on leaves of water lilies of all kinds; the larvæ defacing leaves and sometimes flowers as well.
- G. tuberculata* Say. Greenwood Lake, VI, 21 (Lv), "New Jersey" (Bt); on willow (Hn).
- G. decora* Say. Anglesea in July, common on willow (Sz); larva and adult feed on willows (Ch).
- G. luteola* Müll. = *xanthomelæna* Schrank. The elm-leaf beetle: common throughout the State on elms, which are seriously injured every year and often entirely defoliated: there is a single brood at New Brunswick and northward, but there are two broods in the southern part of the State. Spraying with arsenical poisons as soon as the beetles are observed in spring will kill off the majority and prevent egg laying. A second spraying when the larvæ are first observed will usually end the injury.

MONOXIA Lec.

- M. puncticollis* Say. = *maritima* Lec. Cape May to Sandy Hook along shore. Anglesea, VI, 26, Atlantic City, VI, 24 (W), Atlantic Highlands, VII, 11 (Lv), salt meadows to Passaic river (Bf).

DIABROTICA Chev.

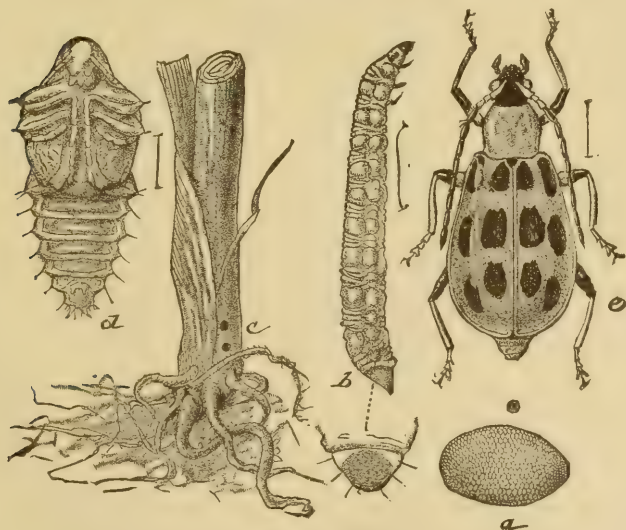


Fig. 137.—Spotted cucumber beetle, *Diabrotica 12-punctata*: a, egg; b, larva; c, holes drilled in corn stalk; d, pupa; e, adult: all enlarged.

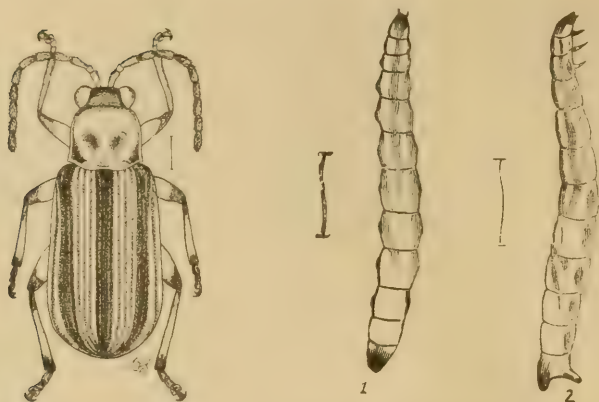


Fig. 138.—Striped cucumber beetle, *Diabrotica vittata*: larva from side and above, and beetle: enlarged.

D. 12-punctata Fabr. Common from April to October throughout the State and on a great variety of plants, favoring Cucurbs: the larva feeds on the roots of corn and probably other grasses.

D. vittata Fabr. The "striped cucumber beetle," common throughout the State, April to October, often seriously injurious to cucurbs of all kinds; the beetle eats into the stem at the surface, the larva mines in it a little under ground. Hibernates as an adult. Remedial measures vary and generally result in an effort to keep away the beetles until the vines are well established. This is sometimes accomplished by planting an excess of seed so as to allow the insects to kill a number and yet leave enough for the farmer: sometimes ground tobacco at the base of the plants is used as a repellant and this is good if it be ground fine. Sometimes the beetles are driven with air-slaked lime or plaster, and this method is general in parts of Gloucester and Salem Counties. Occasionally carbolized lime or plaster is used, and sometimes kerosene or turpentine is mixed with plaster. All these are good, and the best is that which succeeds best with the individual farmer.

D. atripennis Say. Hudson Co. (Ll), Caldwell (Cr), Ft. Lee (Sf).

PHYLLOBROTICA Redt.

P. discoidea Fabr. Woodbury, Brigantine, Anglesea, VI, 23-VII, 12 (W), Hudson Co. (Ll), Newark, Orange Mts. (Bf), Fort Lee (Bt).

LUPERODES Mots = LUPERUS Geoff.

L. meraca Say. Greenwood Lake, VI, 21 (Lv), Newark (Bf), Orange Mts. VI, 10, Fort Lee (Bt), on wild rose (Hn); a general feeder (Ch).

L. cyanellus Lec. Staten Island (Lg); occurs with the preceding and may be confused with it in collections.

CEROTOMA Chevr.

- C. trifurcata* Forst = *caminea* Fabr. Throughout the State in June and July: on *Lespedeza* (Hn): the bean leaf beetle; lives on cow peas, beans, tick-trefoil, bush clover, hog peanut, etc. (Ch). Hibernates as an adult.

BLEPHARIDA Rog.

- B. rhois* Forst. Throughout the State in July, more common in South Jersey: the larva, covered by excrement, feeds on Sumach.

HYPOLAMPSIS Clark.

- H. pilosa* Ill. Merchantville, III, 10, Westville, VII, 7, Anglesea, V, 31, Brigantine, VII, 25, beach drift (W), Madison, VIII, 11 (Pr), Orange Mts. (Bf).

PACHYONYCHUS Chev.

- P. paradoxus* Mels. Atlantic City (Castle).

CEDIONYCHIS Latr.

With this genus begin the typical "flea beetles," which jump even more readily than they fly.

- Ce. gibbitarsa* Say. G. d. (W, Li), Woodbury, VI, 7, Anglesea, VI, 26 (W), Brigantine beach, IX (Hn), Newark, salt meadows (Bf).
- Ce. thoracica* Fabr. Anglesea to the Orange Mts., May to July, Arlington, IV, 17 (Bf), Fort Lee (Bt).
- Ce. vians* Ill. Collingwood, III, 2, Westville, V, 27, DaCosta, Anglesea (W), Lahaway, V, 28 (Sm), Caldwell (Cr), Madison (Pr), Newark district (Bf), Fort Lee (Bt), Snake Hill (Sf).
- Ce. fimbriata* Ill. Orange Mts. (W), Newark, Hopatcong (Pm).
- Ce. petaurista* Fabr. DaCosta, VII, 5 (W), seashore (Li).
- Ce. miniata* Fabr. Atco, V, 29 (W), Anglesea (Li), Woodside, Orange Mts., IV, 3, VIII, 10 (Bf).
- Ce. limbalis* Mels. Lucaston, IV, 25, Avalon, VII, 4, Merchantville, IX, 6 (W), Hopatcong (Pm), Newark, g. d. (Bf), Anglesea, V, 20, Lahaway, V, 28, on cranberry bogs, Jamesburg, VI and VII, South River, VII, 5.
var. *subvittata* Horn. DaCosta (W), Madison, VII, 11 (Pr), Lahaway, V, 28.
- Ce. sexmaculata* Ill. G. d. (W, Li), Madison, VII, 1 (Pr), Newark, common on ash (Bf), Greenwood Lake, V, 22 (Lv).
- Ce. suturalis* Fabr. Clementon, V, 15, Atco, IX, 11 (W), Egg Harbor, Cape May Co., V, 24, Newark.
- Ce. quercata* Fabr. Throughout South Jersey, V, 9, VI, 26 (W), Caldwell (Cr), Newark, g. d. (Bf), Greenwood Lake, VI, 21 (Lv), Fort Lee (Bt).
- Ce. scalaris* Mels. Egg Harbor (Li), Anglesea (W).

DISONYCHA Chev.

- D. pennsylvanica* Ill. Westville, V, 27, Anglesea, V, 31, Da Costa, Clementon, VIII, 6 (W), Newark district (Bf), Lahaway, V, 28: the varieties *limbicollis* Lec., and *pallipes* Cr., occur with the type form, but more rarely; I have both of them from Ocean Co., and from the Newark district. On *Polygonum* (Bt), on *Sagittaria variabilis* (Ch).
- D. quinquevittata* Say. Fort Lee, VIII (Bt): a very rare form in the east; common west of the Mississippi.
- D. crenicollis* Say. South Jersey, g. d., V, 17, VII, 29, VIII, 2, 20 (W), Hudson Co. (Ll), Lahaway, VII, 3.
- D. caroliniana* Fabr. Woodbury, IV, 21, Atco, Westville, VI, 4, 6, Anglesea, VII, 12 (W), Caldwell (Cr), Hudson Co. (Ll), Madison (Pr), Ft. Lee (Bt), Hopatcong (Pm), Burlington Co., New Brunswick; bred from larvæ feeding on *Portulacca oleracea* (Ch).
- D. glabrata* Fabr. Da Costa, VII, 29, Hudson Co. (Ll), salt meadows (Bf), Ft. Lee (Bt); lives on foliage of *Amaranthus* (Ch).
- D. triangularis* Say. Hudson Co. (Ll), Madison (Pr), salt meadows (Bf), Ft. Lee (Bt): lives on *Chenopodium* and *Amaranthus* and adult is, exceptionally, injurious to beets and spinach (Ch).
- D. xanthomelæna* Dalm. G. d. (W, Li), Hudson Co. (Ll), Newark (Soc), Hopatcong (Pm), Gloucester Co., VII, 18: the "Spinach flea beetle"; natural food plants are *Chenopodium*, *Stellaria* and perhaps *Amaranthus* (Ch). I have not found it troublesome in New Jersey.
- D. mellicollis* Say. Anglesea, VII, 12, and g. d. (W), Hudson Co. (Ll).
- D. cervicalis* Lec. Staten Island (Lg): a very rare species.
- D. collata* Fabr. Anglesea, one spec. (W), g. d. (Li), Hudson Co. (Ll), Ft. Lee (Bt).

HALTICA Geoffr.

- H. bimarginata* Say. New Jersey (Horn), Newark, g. d. (Bf).
- H. chalybea* Ill. The "grape flea-beetle": occurs throughout the State, and is sometimes locally injurious. Adults in May and July, larvæ from June to the end of summer. Can be readily controlled by using the arsenites when the larvæ are discovered.
- H. ignita* Ill. Occurs throughout the State, May to August: at Anglesea only the green form similar to that found in Florida occurs (W), hibernates as an adult: attacks strawberry (Ch), common on *Azalea*, *Kalmia*, *Rosacea*, &c. (Hn).

Fig. 139.—Grape flea-beetle, *Haltica chalybea* in all stages on a grape shoot.

Fig. 140.—Grape flea-beetle, *Haltica chalybea*: larva, adult and jumping hind leg, enlarged.

Fig. 141.—Striped flea-beetle, *Phyllotreta vittata*: a, larva; b, adult beetle.

Fig. 142.—Striped sweet potato beetle, *Cassida bivittata*: 1, larvæ or "peddlers" on leaf; 2, larva; 3, pupa; 4, adult; all save 1 enlarged.

Fig. 143.—Black-legged tortoise beetle, *Cassida nigripes*: a, peddlers on leaf; b, larva; c, pupa; d, adult; all save a, enlarged.

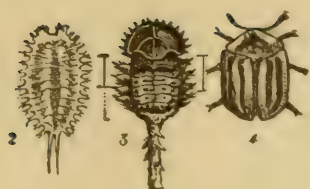


Fig. 142.

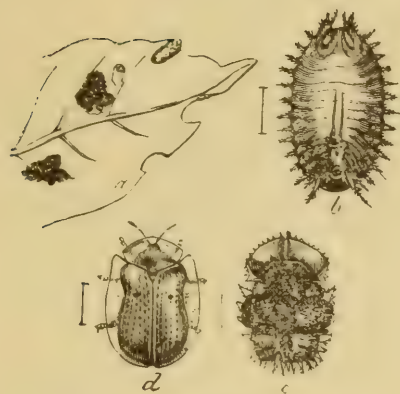


Fig. 143.



Fig. 139.



Fig. 141.



Fig. 140.

H. marevagans Horn. Occurs throughout the State from June to September, more rare in the northern sections, common throughout South Jersey, especially along shore : on evening primrose.

H. punctipennis Lec. Orange Mts., VIII, 12 (Bf).

H. fuscoænea Mels. Throughout South Jersey, May to September, especially common at Anglesea on evening primrose, which is sometimes riddled by them : Orange Mts. (Bf), Atlantic Highlands, VII, 11 (Lv).

Haltica carinata Germ., recorded in the previous edition, was based on a small unique, determined by Dr. Horn ; the correctness of the reference is distinctly questionable.

H. rufa Ill. Newark, Orange Mts. (Bf).

ORTHALTICA Cr.

O. copalina Fabr. Common throughout the State in July ; on leaves of sumach (Ch).

CREPIDODERA Chevr.

C. rufipes Linn. DaCosta, Anglesea (W), g. d. (Li), Hudson Co. (Ll), Hopatcong (Pm), Orange Mts., on honey locust (Bf) : sometimes injurious to peach, apple and other fruit trees, as also to grape vine (Ch). It has not appeared in New Jersey thus far in destructive numbers.

C. helxinus Linn. Common throughout the State, May to September, on willow and poplar : exceptionally attacks leaves of fruit trees (Ch).

C. modeeri Linn. South Orange (Lg).

C. atriventris Mels. Throughout the State in July.

EPITRIX Foudr.

E. fuscula Cr. G. d. (Li), Newark district, rare (Bf), Ft. Lee (Bt). Most abundant on egg plants in D. C. (Ch).

E. cucumeris Harr. The "cucumber flea-beetle" : found everywhere, throughout the summer, on a great variety of field and garden truck, but especially injurious to potatoes, into the leaves of which they eat little round holes. It has been found that the bordeaux mixture exercises a repellant effect, and if paris green be added the plants may be fully protected.

E. parvula Fabr. Westville, I, 28, in hibernation (W).

MANTURA Steph.

M. floridana Cr. Throughout South Jersey, May to July : hibernates as an adult ; Westville, I, 28 (W), Arlington, under stones, in early spring (Bf).

CHÆTOCNEMA Steph.

- C. subcylindrica* Lec. Westville, rare (Li), Newark, under stones, III, 14 (Bf).
C. denticulata Illig. Throughout the State, V, VI, VII: adult feeds on millets (Ch).
C. pinguis Lec. Newark (Bf).
C. minuta Mels. Newark (Bf).
C. alutacea Cr. Anglesea, VI, 2 specimens.
C. obesula Lec. Newark (Bf): a Floridian species, but I believe the determination, made by myself, to be correct.
C. parcepunctata Cr. Staten Island (Ig).
C. pulicaria Mels. Atco, Gloucester, V, 27, 29, Anglesea, Westville, VII, 11, 19 (W), Hudson Co. (Li), New Brunswick, VII, 20, common: sometimes injurious to corn and millet (Ch).
C. confinis Cr. Swedesboro, V, 20, common, feeding on leaves of sweet potato and causing considerable injury; found in hibernation Westville, I, 28 (W), Arlington, I, 31 (Bf). This beetle eats channels along the veins of the leaves soon after the plants have been set out. Plants should be dipped in a strong mixture of arsenate of lead before being set out; but the roots should not be dipped—only the leaves.

SYSTEMA Clark.

- S. hudsonias* Forst. Common throughout the State in July and August on a great number of weeds.
S. frontalis Fab. With the preceding, June and July: adult feeds on *Polygonum* and *Chenopodium*, and attacks exceptionally, various cultivated crops (Ch), *e. g.* cranberries (Sm).
S. elongata Fab. Orange Mts., rare (Bf).
S. tæniata Say. Throughout the State, June and July, sometimes abundant on cultivated crops like carrot, parsley, &c. The variety *blanda* Mels., is as common as the type: abundant on *Ambrosia artemesifolia*. The arsenites are indicated whenever they can be safely employed. Otherwise a strong tobacco decoction will answer almost as well.
S. marginalis Ill. Clementon, VIII, 6 (W), Orange Mts. (Bf), Ft. Lee (Bt), Spring Lake (Ch): sometimes abundant on oak (Hn).

LUPERALTICA Cr.

- L. fuscula* Lec. G. d., rare (Bf), Jamesburg.
L. senilis Say. Da Costa, VIII, 14, Atco, IX, 11 (W), Newark (Bf).

GLYPTINA Lec.

- G. bicolor* Horn. Anglesea (W).
G. spuria Lec. G. d., rare (Li), Hudson Co. (Li): abundant on *Monarda punctata*, August (Hn).

PHYLLOTRETA Foudr.

- P. sinuata* Steph. Burlington Co., Westville, I, 28, VII, 2 (W), Hudson Co. (Ll), Hopatcong (Pm), Madison, VIII, 1 (Pr).
- P. vittata* Fabr. Common throughout the State all summer, on cabbage and other *Cruciferae*.
- P. bipustulata* Fabr. Camden, III, 3, Anglesea, VI, 26 (W), g. d. (Li), Orange Mts., V, 30 (Bf), Ft. Lee (Bt).
- P. chalybeipennis* Cr. Cape May, VII (Sz), Anglesea, Atlantic City (W), Sandy Hook (Bt), Sea Girt, VIII (Bf): a maritime form, on *Cakile americana* (Ch).
- P. picta* Say. Da Costa, Berlin, VI, 12, 25, Atco, VII, 17 (W), Orange Mts. (Bf), Greenwood, VI, 21 (Lv), Snake Hill, Ft. Lee, (Sf), g. d.: on hickory sprouts, etc., in July (Hn).

LONGITARSUS Latr.

- L. testaceus* Mels. South Jersey, generally, Westville, VII, 2 (W), Newark, under stones in early spring (Bf).
- L. alternatus* Ziegl. Jamesburg, VII, 4 (Lg).
- L. melanurus* Mels. Newark, III, 5 (Bf), Ft. Lee, Snake Hill (Sf).
- L. insolens* Horn. New Jersey (Horn), Anglesea (W), g. d. (Li), Newark (Bf).

DIBOLIA Latr.

- D. borealis* Chev. Throughout the State, VI and VII: lives on plantago; exceptionally attacks turnip (Ch).

PSYLLIODES Latr.

- P. punctulata* Mels. G. d., rare (Li), Anglesea, VII (Sz), Hudson Co. (Ll), Newark, under stones, II, 13, 14 (Bf): adult devours leaves of rhubarb (Ch).
- P. convexior* Lec. G. d., rare (Li), Anglesea (W), Hudson Co. (Ll).

MICRORHOPALA Baly.

- M. vittata* Fabr. Anglesea, VII (W, Sz), Hudson Co. (Ll), Newark, g. d. (Bf), Chester (Dn), Highlands, Sandy Hook (Ch), Ocean Co., VI, 20: larva mines the leaves of golden rod (U).
- M. xerene* Newn. So. Camden, g. d., in wet places (W), Westville (Li), Hopatcong (Pm), Ft. Lee (Sf): larva mines leaves of golden rod (U).
- M. erebus* Newn. Jamesburg, VI, one spec.
- M. excavata* Oliv. Da Costa, VI, 12, Atco, IX, 11, Hemlock falls, VII, 4 (W), g. d. (Li), Hopatcong (Pm), Fort Lee (Bt).
- M. porcata* Mels. Hudson County (Ll), Fort Lee, rare (Bt), Wenonah, one spec. (Li).

ODONTOTA Chevr.

- O. scapularis* Oliv. Anglesea, V, 30, VI, VII, and g. d. (W), Hudson Co. (Li), Newark, g. d. (Bf), Madison, VIII, 6 (Pr), Fort Lee (Bt), Hopatcong (Pm), Jamesburg.
- O. notata* Oliv. G. d. (Li), Da Costa, VI, 12 (W); on *Tephrosia virginica*.
- O. bicolor* Oliv. South Jersey, g. d., V and VIII (W), Orange Mts., VI, 3 (Bf), Ft. Lee, Hopatcong (Sf).
- O. hornii* Sm. Atco (Li) Da Costa, VII, 5 (W), on *Tephrosia virginica*.
- O. dorsalis* Thunb. Throughout the State in May, June and August; the larvæ making blotch mines in the leaves of *Robinia*: exceptionally attacks red clover, hog-peanut and some fruit trees; larvæ also reared from Soy beans (Ch).
- O. rubra* Web. Lucaston, IV, 25, Atco, 29 (W), Lahaway, V, 20 (Sm); common throughout the State with the preceding on *Robinia*; also common on bass-wood (Ch).
- O. nervosa* Panz. Lahaway, V, 28, on locust (Sm), Newark, g. d. (Bf), Orange, VI (Ch), Fort Lee, VI (Bt).

CHARISTENA Baly.

- C. nigrita* Oliv. Da Costa, VII, 30 (W), Newark, Irvington (Bf).
- C. ariadne* Newn. Da Costa, VII, 30 (W), Atco (Li).

STENISPA Baly.

- S. metallica* Fabr. Merchantville, III, 30, Westville, V, 29, in wet places throughout South Jersey (W), Newark district, in swamps (Bf), Snake Hill (Bt), Ft. Lee (Sf), Lahaway, V, 28.

CASSIDA Linn.

- C. nigripes* Oliv. Throughout South Jersey on sweet potato vines in May: not in itself destructively abundant.
- C. bivittata* Say. Very common and often injurious on sweet potato vines throughout South Jersey: Mr. Schwarz says this is not originally a native of the State, but has spread northward with the cultivation of the sweet potato. This is one of the "Gold-bugs," the larvæ of which are known as "peddlers." They attack the plants soon after they are set out and injure them severely before they can get a start, especially in dry weather. Plants should be dipped in strong arsenate of lead, the roots being protected from the poison.

COPTOCYCLA Chevr.

- C. aurichalcea* Fab. Occurs throughout the State on *Convolvulus* in May and June; common and destructive on sweet potatoes in South Jersey. Another of the "gold bugs"; remedies as before.

C. guttata Oliv. Throughout the State in May and June; more common southwardly where it also occurs on sweet potatoes, though not in itself destructive.

C. purpurata Boh. Westville, I, 28, in hibernation (W).

C. clavata Fabr. Occurs throughout the State, though usually not common: sometimes it becomes locally abundant on *Solanacea* and may cause injury to potatoes.

CHELYMORPHA Chev.

C. argus Licht. Common throughout the State: found on *Convolvulus*, *Asclepias* and sometimes attacks raspberry (Ch).

Family BRUCHIDÆ.

These are the pea and bean weevils, the larvæ of which live in the seeds of leguminous and other plants. The beetles are short and chunky, the wing covers cut off square behind, the abdomen obese, head small, posterior legs long, the thighs swollen as if for jumping. In color they are usually gray, mottled with black and white, the markings formed of scales and hair covering the surface, so that when these are rubbed off the beetles are mostly uniform black.



Fig. 144.—The “bean weevil,” much enlarged: *b*, an infested bean.

The injury is chiefly done to the stored product, peas, beans and lentils being rarely free, and several larvæ being usually found in the larger seeds. Fumigating with bisulphide of carbon, as has been elsewhere described, will kill these insects without

injuring the germinating power of the seeds, provided they are not exposed to the fumes more than twenty-four hours.

SPERMOPHAGUS Sch.

S. robiniae Sch. South Orange (Bf). New Brunswick. The larva in seeds of locust (*Robinia*) and the species is probably found wherever that tree grows.

BRUCHUS Linn.

B. rufimanus Sch. Newark (Bf), found in lentils and may not be a native of the State.

B. pisorum Linn. = *pisi* L. Found everywhere, breeding in peas: it is the well known pea-weevil.

B. mimus Say. Atco (Li).

- B. quadrimaculatus* Fabr. Orange Mts., VII, 12 (Bf), "New Jersey" (Li).
B. discoideus Say. Anglesea (W).
B. bivulneratus Horn. Hudson Co. (Li), Westville (W), breeds in seeds of *Cassia* (Sz).
B. cruentatus Horn. Atco, V, 29 (W), Plainfield, sweeping around cultivated peas (Sf).
B. nigrinus Horn. Newark, V, 29 (Bf), Highlands (Sf), Da Costa (W), throughout South Jersey (Li).
B. floridæ Horn. West Bergen (Bf), very rare.
B. alboscuteUellatus Horn. Hudson Co. (Li), Newark (Bf), Anglesea, Clementon (W), South Jersey, g. d. (Li), South River, Jamesburg, VII, 8, 15: breeds in capsules of *Ludwigia alternifolia*.
B. calvus Horn. Anglesea, VII (Sz), V, 28 (Sm), Da Costa, Westville (W), g. d. (Li), Highlands (Sf), Jamesburg, VII, 15.
B. obsoletus Say. Gloucester, very rare (W), Snake Hill, Ft. Lee (Sf); breeds in *Tephrosia* (Ch).
B. obtectus Say. = *fabæ* Riley. The "bean weevil"; common throughout the State, and often causing much loss in the stored product.
B. hibisci Oliv. Woodbury (Li), Anglesea; breeds in seeds of mallow, V, 28, to IX, 20: very common.
B. longistilus Horn. Atco, Anglesea (W): also infests mallows.
B. musculus Say. Brigantine, IX, on Solidago (Hn), Anglesea, Atco, Westville (W), Snake Hill, Ft. Lee (Sf), Madison (Pr).
B. macrocerus Horn. Anglesea (W), "New Jersey" (Li).

Mr. Chittendon thinks *B. chinensis* Linn. = *scutellaris* Fabr., an introduced species, should also occur in this State.

ZABROTUS Horn.

- Z. zubnitens* Horn. Anglesea (W), Atco, DaCosta, Buena Vista (Li).

Family TENEBRIONIDÆ.

The "darkling beetles" are usually black or dark brown in color, oblong or oval in shape with a peculiar, somewhat loosely jointed appearance and long rather clumsy and awkward legs. The anterior and middle feet or tarsi are 5-jointed, while the posterior are 4-jointed only, and this is a character easily seen in these insects which are usually of moderate or rather large size. In addition the antennæ are moniliform or bead-like and the mouth parts rather small and not at all prominent. As a rule they are feeders on fungi or on dead or dry wood or other vegetable products; hence scavengers rather than anything else. The larvæ are long, slender, often flattened a little like a wire-

worm in general appearance and they live in dead or decaying wood, dry vegetable products or fungi, as do the adults. A few of the species are of economic importance as granary pests, *e. g.*, the meal-worm ; but none attack growing crops.

EPITRAGUS Lec.

E. arundinis Lec. Common along the coast, Sandy Hook to Cape May, VII-IX, on reeds, grasses and other vegetation.

E. canaliculatus Say. Staten Island seashore (Lg).

EPITRAGODES Casey.

E. tomentosus Lec. Sandy Hook, rare (Bt)

PHELLOPSIS Lec.

P. obcordata Kirby. Hudson Co. (Ll), Ft. Lee ; on dry fungoid growths on trees : local and not common.

NYCTOBATES Guer.

N. pennsylvanica DeG. Common throughout the State, IV-VIII, under oak and pine bark.

var. barbata Knoch. With the type form (W).

MERINUS Lec.

M. lævis Oliv. Ft. Lee (Bt), Hudson Co. (Ll), Avalon, VII, 30 (Jn), g. d., rare (W).

UPIS Fabr.

U. ceramboides Linn. Ft. Lee (Bt), Newark (Soc) ; Mr. Schwarz says this is a boreal species, and the records may perhaps be inaccurate.

HAPLANDRUS Lec.

H. femoratus Fabr. Occurs throughout the State under stones and bark, usually the latter.

H. ater Lec. Also g. d ; more rare than the preceding.

SCOTOBATES Horn.

S. calcaratus Fabr. Chester (Dkn), Madison (Pr), Ft. Lee, VII (Bt), Caldwell (Cr), Newark district (Bf), g. d. (W) ; not rare anywhere.

XYLOPINUS Lec.

X. saperdoides Oliv. Chester (Dkn), Palisades, VI, 28 (Lv), Caldwell (Cr), Newark (Soc), So. Amboy (Bt), g. d. (W, Li) ; not common.

X. rufipes Say. Caldwell (Cr), So. Amboy (Bt), g. d. (W, Li).

X. ænescens Lec. Caldwell (Cr), So. Amboy (Bt), "New Jersey" (Horn).

TENEBRIO Linn.

T. obscurus Fabr. Throughout the State.

T. molitor Linn. With the preceding. Both of these species are imported, and live in granaries, store-houses and the like. The larvæ are the "meal worms" which occur wherever there is a neglected heap of grain refuse. Occasionally they are troublesome; but usually strict cleanliness, removing their breeding places serves to keep them in check; when its use is practical bisulphide of carbon will kill both adults and larvæ.

T. castanea Knoch. Da Costa, rare (Li).

T. tenebrioides Beauv. Ft. Lee, IV, 11 (Bt), Caldwell (Cr), Snake Hill, IV, 26 (Lv), Newark district (Bf), g. d. (W, Li); under bark, also in out-houses in refuse (Ch).



Fig. 145.—The "meal-worm,"
Tenebrio molitor: *a*, larva;
b, pupa; *c*, adult; *d* to
h, structural details,
enlarged.

OPATRINUS Latr.

O. notus Say. Common throughout the State, usually under bark, sometimes under stones.

O. aciculatus Lec. Hopatcong (Pm), Woodside (Bf), Jersey City; always rare.

BLAPSTINUS Latr.

B. pratensis Lec. Greenwood Lake (Bt).

B. moestus Mels. Brigantine beach, IX (Hn).

B. interruptus Say. Brigantine beach, IX (Hn), Anglesea, VII (Sz); rare.

B. metallicus Fabr. Recorded from all parts of the State and all seasons, usually common: as a rule it occurs under chips, boards or stones in sandy places.

AMMODONUS Muls.

A. fossor Lec. West Bergen, rare (Bf).

EPHALUS Lec.

E. latimanus Lec. Ocean Beach (Pr), one specimen only: the species occurs very rarely near the coast in sand, as I found it on Long Island.

TRIBOLIUM Mac L.

T. ferrugineum Fabr. Throughout the State.

T. confusum Duval. With the preceding and probably mixed with it. Both are introduced species and occur in meal, farina and other cereals in stores and granaries, often causing considerable injury. Where these

species occur with others they eat as well the eggs and larvæ of the others, and all the dead of their own kind ; but they do not eat the cast larval skins which accumulate on the surface of the infested material and indicate the presence of the species. The remedial measures already suggested under the *Cucujidæ* are applicable here as well

DICEDUS Lec.

D. punctatus Lec. Staten Island (Lg).

GNATHOCERUS Thunb.

G. cornutus Fabr. Also an imported species, introduced on cereals, and sometimes found with *Tribolium*. When the two occur together in a confined space the *Tribolium* eventually destroys the *Gnathocerus*.

ALPHITOBIOUS Steph.

A. diaperinus Panz. Another introduced species; Newark (Soc), occurs in pigeon coops feeding on cornmeal (Bt), commonly found in granaries and store-houses southward, among refuse (Ch).

A. piceus Oliv. Newark, around lights (Bf).

ULOMA Lap.

U. impressa Mels. Ft. Lee (Bt), Newark, g. d. (Bf), Brigantine, mainland, IX (Hn), g. d. (W); under bark and in rotten wood.

U. imberbis Lec. Ft. Lee (Bt), Brigantine, mainland, IX (Hn), g. d., common (W).

U. punctulata Lec. Spring Lake (Ch), g. d., less common than the preceding (W).

EUTOCHIA Lec.

E. piceus Mels. Weehawken, IV, 11 (Bt), Snake Hill, Ft. Lee (Sf), Atlantic City (Castle), g. d. (Bf, W, Li); occurs under stones and on moss.

ANÆDES Blanch.

A. brunneus Ziegl. Common under old leaves throughout the State and found at almost all times by sifting.

PARATENETUS Spin.

P. fuscus Lec. Greenwood Lake, Ft. Lee (Sf), Camden, XI, 23, sifting (W), Anglesea, VII (Sz).

P. punctatus Sol. Staten Island (Lg), Spring Lake (Ch), "New Jersey" (Dietz, Bt).

PHALERIA Latr.

- P. testacea* Say. Common all along shore from Sandy Hook to Cape May, in the sand under wash-up, carrion and rubbish of all kinds.

DIAPERIS Geoff.

- D. hydni* Fabr. Throughout the State, locally common, feeding on fungi.

ARRHENOPLITA Kirby.

- A. viridipennis* Fabr. Ft. Lee, on fungus on oak (Bt), Hudson Co. (Ll), g. d., common (W).
A. bicornis Oliv. Common throughout the State on fungus on trees.

PLATYDEMA Lap.

- P. excavatum* Say. Common throughout the State under bark of trees infested with fungi, where also all the other species occur.
P. ruficorne Sturm. Throughout the State, locally common.
P. ellipticum Fabr. G. d., locally common (W).
P. americanum Lap. Ft. Lee (Bt), g. d. common (W).

PHYLETHUS Meg.

- P. bifasciatus* Say. Greenwood Lake (Sf), Hudson Co. (Ll), Newark, Union, rare (Bf); commonly found in stables, granaries, &c., among refuse: an introduced species (Ch).

HYPOPHLÆUS Fabr.

- H. cavus* Lec. G. d., rare (W); predaceous in galleries of *Xyleborus* (Sz, Ch).
H. parallelus Mels. Newark, Orange Mts., rare (Bf), Westville (Castle), Brigantine beach, IX (Hn), g. d. (W), in galleries of *Tomicus*, under pine bark (Ch).
H. thoracicus Mels. Palisades, VI, 28 (Lv), g. d., rare (W), in galleries of *Xyleborus* (Sz), under pine bark (Ch).

BOLETOTHERUS Cand.

- B. bifurcus* Fabr. Common throughout the State on tree fungus (*Boletus*).

BOLETOPHAGUS Ill.

- B. corticola* Say. Ft. Lee district (Bt), Hudson Co. (Ll).
B. depressus Rand. Hudson Co. (Ll), g. d. (W).

HELOPS Fabr.

- H. micans* Fabr. Locally common throughout the State, under bark.
H. americanus Beauv. G. d., rare (W).
H. venustus Say. Atlantic City (Castle), g. d., rare (W); on dead branches of oak (U).
H. gracilis Bland. Atlantic City, Central Jersey (Castle), Atlantic, Cape May Co., rare, on pines, DaCosta, in May (W).
H. aereus Germ. Throughout the State, rather common locally; at base of pine trees in May (Bt).

MERACANTHA Kirby.

- M. contracta* Beauv. Hopatcong (Pm), Greenwood Lake (Bt), g. d., rare (Bf, W, Li); on old trees.

STRONGYLIIUM Kirby.

- S. tenuicolle* Say. Madison (Pr), Ft. Lee (Bt), Hudson Co. (Ll), g. d., rare (Bf).
S. terminatum Say. Staten Island (Lg).

Family CISTELIDÆ.

In general structure like the preceding; but with longer, more slender antennæ and generally smooth, pubescent surface. They are usually brown in color with none or only confused maculation, very convex upper surface, tapering often to a point posteriorly.

They are found on leaves, flowers and under bark, the larvæ so far as known living in rotten wood and somewhat resembling wire-worms in shape. None are of economic importance.

LOBOPODA Sol.

- L. punctulata* Mels. Anglesea, VII (Sz), g. d., rare (W); on dry twigs.
L. atra Say. Staten Island (Lg), Orange Mts. (Bf), Atco (Li).

HYMENORUS Muls.

- H. pilosus* Mels. Anglesea (W).
H. obscurus Say. Greenwood Lake, VI, 21 (Lv), Anglesea, g. d. (W); all the species on dead branches.
H. niger Mels. Anglesea (W), g. d. (Li).
H. rufipes Lec. Caldwell (Cr).

CISTELA Fabr.

C. brevis Say. G. d. rare (W); the species generally on flowers.

C. sericea Say. Common, VI, throughout the State.

ISOMIRA Muls.

I. quadristriata Coup. Hopatcong (Pm), Orange Mts., common on dog-wood (Bf), g. d., common (W).

I. valida Sz. Anglesea on dead holly branches (W).

MYCETOCHARA Berth.

M. haldemanni Lec. Snake Hill, one spec. (Bf).

M. fraterna Say. Orange (Ch), Orange Mts., VI, 19 (Bf), "New Jersey" (Horn); the species on old wood.

M. analis Lec. "New Jersey" (Casey).

M. binotata Say. Staten Island (Lg), Orange Mts., VI, 16 (Bf).

CAPNOCHROA Lec.

C. fuliginosa Mels. Hopatcong (Pm), Caldwell (Cr), Newark (Soc), Orange Mts. (Bf), g. d. (W).

ANDROCHIRUS Lec.

A. fuscipes Mels. Lake Hopatcong (Pm).

A. erythropus Kirby. G. d., not common (W)

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Family LAGRIIDÆ.

Represented by only three species in our fauna, none of them in the least harmful, nor, on the other hand, beneficial. Head and thorax are rather narrow, of about equal size, nearly cylindrical, the elytra abruptly broader, so that distinct shoulders are formed. In colors the species are black or bronzed, while the texture of the wing covers is decidedly thin or somewhat flexible. The adults are found on flowers, leaves, or under bark of trees, while the larvæ are credited with predatory tendencies.

ARTHROMACRA Kirby.

A. ænea Say. Hopatcong (Pm), Greenwood Lake, VI, 21 (Lv), Ft. Lee, VI (Bt), Atlantic, Cape May Counties.

STATIRA Latr.

S. croceicollis Mükl. Staten Island (Lg).

S. gagatina Mels. Throughout the State not common ; a few examples each year, under bark or on flowers.

Family MELANDRYIDÆ.

The beetles of this family are also practically unimportant to the agriculturist, having the same general habits as those of the preceding families of the Heteromera, i. e., where the hind tarsi have four joints only. They are very diverse in form, but usually slender, often elliptical in outline, convex or flattened, smooth or striate, usually densely clothed with fine silky hair or pubescence, the antennæ moderate in length, the palpi often very long. The head is hidden in the thorax as far as the eyes, and the prothorax is nearly or quite as broad at base as the elytra. They are feeders in dry wood, dry fungi and dry vegetable matter generally. The larvæ are of the usual slender, cylindrical form, the head thorax and tail segments being chitinized.

TETRATOMA Fabr.

T. truncorum Lec. Westville (Li), in old fungus (W).

T. tessellata Mels. Hopatcong (Pm), Ft. Lee (Bt), Staten Island (Lg), Woodside, Hudson Co., on fungus on dead branches, May to August (Bf).

PENTHE Newm.

P. obliquata Fabr. Throughout the State under bark, sometimes common : this is the form with yellow scutellum.

P. pimelia Fabr. With the preceding, usually more rare.

SYNCHROA Newm.

S. punctata Newm. Palisades, V, 17 (Lv), Ft. Lee, VI (Bt), Newark district, common on dry limbs everywhere (Bf), Highlands, VI, under bark of deciduous trees (Ch), g. d. (W).

PROTHALPIA Lec.

P. undata Lec. Greenwood Lake, VI, 22 (Lv), Hemlock Falls, V, 31 (W), Newark, Orange Mts., in fungus on dead branches.

MELANDRYA Fabr.

M. striata Say. Palisades, V, 24 (Lv), Ft. Lee, rather common, VI (Bt), Orange Mts., g. d., on fungus in rotten trees or, early, under bark (Bf), g. d. (W).

EMMESA Newn.

E. labiata Say. Woodside (Bf), Ft. Lee; rare.

XYLITA Payk.

X. lævigata Hellw. Staten Island (Lg).

ZILORA Muls.

Z. nuda Prov. Eagle Rock, VII (Bf); rare.

SPILOTUS Lec.

S. quadripustulosus Mels. Orange Mts., VI, 2, 16 (Bf), Staten Island, on sour gum (Thompson), Anglesea (W).

SCOTOCHROA Lec.

S. atra Lec. Newark, off fungi on dry or dead branches, rarely, all summer (Bf).

SERROPALPUS Hellw.

S. barbatus Schall. Orange Mts., off dry fungus (Bf), So. Orange, VI, at light (Ch), Anglesea (W).

PHLÆOTRYA Steph.

P. simulator Newn. Newark, Orange Mts., rare (Bf).

P. liturata Lec. Hopatcong (Pm), Madison (Pr), Ft. Lee (Sf), Palisades, VI, on dead elm (Lv), Caldwell (Cr), Newark district, off fungi on dry branches (Bf), Anglesea, VII (Sz).

P. vaudoueri Muls. = *fusca* Lec. Hopatcong (Pm), Greenwood Lake, Ft. Lee (Sf).

SYMPHORA Lec.

S. flavicollis Hald. Orange Mts., V, 30, Newark (Bf), Staten Island (Lg), Highlands, VI (Ch).

S. rugosa Hald. Hopatcong (Pm), Ft. Lee (Sf), Newark (Soc), Orange Mts. (Bf), Atco, III, 18 (W), Anglesea, VII (Sz).

ANISOXYA Muls.

A. glaucula Lec. Newark (Soc), Orange Mts. (Bf), Atco (W), Anglesea, VII (Sz).

EUSTROPHUS Ill.

E. bicolor Say. Newark, g. d. (Bf), Westville, Anglesea (W), Hoboken district.

E. bifasciatus Say. Woodside, IV, 10, dug out of rotten wood (Bf), Highlands, Spring Lake, VI, IX (Ch), Westville, Gloucester, Anglesea (W).

E. tomentosus Say. Hopatcong (Pm), Westville (Li).

HALLOMENUS Panz.

H. scapularis Mels. Newark (Lœffler), Orange Mts.

ORCHESIA Lec.

O. castanea Mels. Ft. Lee (Sf), Newark (Bf), Anglesea, VII (Sz), g. d. (W); in hard fungi on trees.

O. gracilis Mels. Staten Island (Lg), Orange Mts. (Bf).

MICROSCAPHA Lec.

M. clavicornis Lec. Highlands, VI (Ch).

SCRAPTIA Lat.

S. sericea Mels. Newark (Lœffler), Buena Vista, Da Costa (Li); occurs on blossoms.

ALLOPODA Lec.

A. lutea Hald. Eastern New Jersey (Dietz), Buena Vista, Da Costa (Li), Anglesea (W).

CANIFA Lec.

C. plagiata Mels. Buena Vista (Li).

C. pusilla Hald. Orange Mts., V, 30, Newark (Bf).

C. pallipennis Lec. Atco (W).

C. pallipes Mels. Hopatcong (Pm), Newark (Lœffler).

NOTHUS Oliv.

N. varians Lec. Anglesea (W).

MYCTERUS Clairv.

M. scaber Hald. Hudson Co., not rare. The additions predicted in the first edition of this list may be said to have been very completely made

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Family PYTHIDÆ.

Generally resemble the *Melandryidæ* in habits and structure, but have the prothorax narrowed behind, the wing covers thus forming distinct shoulders, and there may be either a deep central or two lateral depressions on the upper side. In form they are very long and narrow and may be much flattened or a little convex. Only three species occur thus far in New Jersey and these are of no economic importance.

BOROS Hbst.

B. unicolor Say. Palmyra, V (Jn); under pine bark.

PYTHO Latr.

P. americanus Kirby. Palmyra, III (Jn), Palisades, under pine bark.

SALPINGUS Gyll.

S. virescens Lec. Orange, VI (Ch), Orange Mts., Newark (Bf); both record the captures at light.

Family CEdemeridÆ.

Long, slender, cylindrical or semi-cylindrical beetles, rarely a little flattened, the head and thorax narrower throughout than the elytra, which latter are somewhat soft in texture, smooth or with fine punctures and silky hair. The antennæ are long and slender and the feet have the joint next the last deeply bi-lobed or cleft. The beetles are found on flowers, on foliage and sometimes in crevices; the larvæ have the slender form general in this series, but the head is broader than usual. None of them are economically important.

MICROTONUS Lec.

M. sericans Lec. Ft. Lee, So. Orange (Sf), Orange Mts. (Bf), Newark (Soc), Jamesburg, Atco (Li), Da Costa, Cape May C. H., V, 28 (W), Anglesea, VII, (Sz).

NACERDES Schm.

N. melanura Linn. Throughout the State, but more common near the coast; not rare in cities, in wood sheds or about cellars. "This species was found in great abundance on an old wreck on the beach at Anglesea, VI, 30, varying much in size and color" (W). The species is an imported one.

XANTHOCHROA Schm.

X. lateralis Mels. Newark (Soc): I have not seen the specimen, and the record is open to doubt; Dr. Horn cites the southern Atlantic region, so the occurrence of the species in New Jersey is not improbable: Mr. Palm records it from Hopatcong.

ALLOXACIS Horn.

A. dorsalis Mels. Common along shore from the Atlantic Highlands to Cape May, in or under wet boards, timbers, &c.

COPIDITA Lec.

- C. notoxoides* Fabr. Buena Vista (Li), Atco, DaCosta (W), Lahaway, VI, 1, on flowers.
C. thoracica Fabr. Atlantic City, Buena Vista (Li), Anglesea (W), Lahaway, VI, 1, on flowers.
C. suturalis Horn. Anglesea (W).

ASCLERA Schm.

- A. ruficollis* Say. Throughout the State, common on willow catkins in early spring.

OXACIS Lec.

- O. tæniata* Lec. Anglesea (Li).
-

Family CEPHALOIDÆ.

The single species that occurs in our State resembles at first sight the longicorn genus *Leptura*, but is more slightly built with more slender legs and antennæ. This resemblance, with the difference in the structure of the foot joints, makes the species easily recognizable. It occurs on dry branches and is rare; therefore of no economic importance.

CEPHALOON Newm.

- C. lepturoides* Newm. Hopatcong (Pm), Greenwood Lake, VI (Bt), Orange Mts., g. d., VI, 2 (Bf), Orange, VI (Ch).
-

Family MORDELLIDÆ.

Small, usually wedge-shaped beetles, covered with fine silky hair, which, on the black species, sometimes forms lines, bands or spots on the upper side. The hind legs are usually very long and stout, fitted for leaping; the abdomen is produced into a more or less obvious style or pointed process, the antennæ are long and slender, more or less serrated, and the thorax is as wide at base as the elytra. They are found on flowers or on dead trees, and are sometimes brightly colored and banded. Most of them are common, at least locally, and dozens of them may often be taken from a single cluster of *Spiræa* blossoms.

Few of the larvæ are known, and these are long, slender, and live in decaying wood or the pith of plants. None of them are of economic importance.

PENTARIA Muls.

P. trifasciata Mels. Gloucester, VI, 10, g. d. (W).

ANASPIS Geoffr.

A. flavipennis Hald. Hopatcong (Pm), Orange Mts. (Bf), Staten Island (Lg).

A. rufa Say. Newark district (Bf), Atco, V, 18 (W), Orange Mts., locally common, Lahaway, on blossoms of sour gum, V.

TOMOXIA Costa.

T. bidentata Say. Snake Hill (Sf), Caldwell (Cr), Orange Mts., VI, 26 (Bf); on dead trees; nowhere common.

T. lineella Lec. Hopatcong (Pm), Milburn (Bf), Atco, V, 28, on dead trees (W), Middlesex Co., VII, 20.

T. inclusa Lec. Snake Hill (Sf).

MORDELLA Linn.

M. melæna Germ. Caldwell (Cr), Orange Mts., New Brunswick, VII, 7, Jamesburg, VII, 10.

M. scutellaris Fabr. Common throughout the State, VI, VII.

M. octopunctata Fabr. Snake Hill (Sf), g. d., rare (Bf), Gloucester, Camden Co., rare, Anglesea, VI, 15, common (W).

M. lunulata Helm. New Brunswick, VII, 20, South Amboy, VI, 8.

M. marginata Mels. Da Costa, VII, 26, g. d. (W), Orange Mts., Jamesburg, VII, 15, Lahaway, VI, 10, New Brunswick, VII, 20.

M. serval Say. Lake Hopatcong (Pm).

M. triloba Say. Orange Mts (Bf), Atco, VII, 15 (W).

M. discoidea Mels. Caldwell (Cr), Gloucester, VII, 2 (W), Orange Mts., rare.

M. sp. nov. Lahaway, VI, 1; common.

MORDELLISTENA Costa.

M. arida Lec. Atco, V, 14 (W).

M. trifasciata Say. Hopatcong (Pm), Orange Mts. (Bf), Gloucester, VII, 2 to VIII, 9 (W).

M. lepidula Lec. Orange Mts., New Brunswick, VII, 20, rare

M. limbalis Mels. Orange Mts., rare.

M. vapida Lec. Orange Mts. (Bf, Sm).

M. fulvicollis Mels. Orange Mts., one specimen.

M. ornata Mels. Hopatcong (Pm), "New Jersey" (Sf).

- M. militaris* Lec. Orange Mts., VI, 26 (Bf).
M. scapularis Say. Orange Mts. (Sm), VI, 26 (Bf).
M. comata Lec. Hopatcong (Pm), Orange Mts. (Sm), VI, 17, 26 (Bf), Anglesea, VII, g. d. (W), common.
M. aspersa Mels. Throughout the State, the most abundant species in my experience, V-VIII.
M. amica Lec. Orange Mts., rare (Bf).
M. andreæ Lec. Anglesea, V, 27.
M. ancilla Lec. G. d., not common (W).
M. varians Lec. Westville, VII, 2 (W), Brigantine beach, IX (Hn), Orange Mts., common.
M. ustulata Lec. Newark, Orange Mts., rare (Bf).
M. impatiens Lec. Orange Mts., Newark (Bf).
M. nigricans Mels. Newark, Orange Mts. (Bf, Sm), g. d. (W), Jamesburg, VII, 15, Anglesea, V, 28; locally not rare.
M. ruficeps Lec. "New Jersey," exact locality unknown.
M. splendens Sm. Anglesea, VIII (W).
M. pustulata Mels. Hopatcong (Pm), Newark, Orange Mts. (Bf, Sm), South River, VII, 5, Anglesea, V, 28.
M. fuscipennis Mels. Near Hoboken.
M. morula Lec. Staten Island (Lg), New Brunswick, VII.
M. ambusta Lec. Orange Mts. (Bf), Lahaway, VI, 1.
M. unicolor Lec. Anglesea, VII, 6, g. d. (W), Orange Mts.
M. marginalis Say. Newark, Orange Mts. (Sm), VI, 2 (Bf), Gloucester, VI, 17, Anglesea, VII, 6 (W).
M. pubescens Fabr. Newark (Bf), Anglesea, VII, 6 (W), Orange Mts., Lahaway, VI, 12.
M. bihamata Mels. Newark (Soc).
M. liturata Mels. Orange Mts. (Bf), Anglesea, VII (Sz), Lahaway, VI, 7.
M. fuscata Mels. Orange Mts., rare.

"Orange Mts.," in my collections in this family means the hills back of Montclair and the first ridge generally to the north; the date is usually July.

Family ANTHICIDÆ.

Small or moderate-sized species, varying much in form, often brightly and contrastingly colored, banded or otherwise marked, the thorax narrower than the elytra, the head drooping, with a rather long neck and long slender antennæ. They live under varying conditions, some of them in sand, often resembling ants in appearance, and running rapidly when turned out of their burrows. None of them are in any way injurious.

CORPHYRA Say.

- C. funebris* Horn. Newark (Bf), along the coast in the wash-up; not rare (W).
C. elegans Hentz. Caldwell (Cr); rare.
C. terminalis Say. Newark, V, 29, one specimen (Bf).
C. newmani Lec. Orange Mts., VI, common (Ch).
C. collaris Say. Caldwell (Cr), Orange, VI (Ch), along the coast in the wash-up, not rare (W).

XYLOPHILUS Latr.

- X. nebulosus* Lec. Madison, VII, 16 (Pr), Orange Mts. (Bf).
X. fasciatus Mels. Orange Mts., VIII, not rare (Bf).
X. quercicola Sz. Lake Hopatcong (Pm).

ZONANTUS Casey.

- Z. subfasciatus* Lec. Highlands, IV, under stones (Sf).
Z. tricuspidis Casey. Orange Mts., VII (Sf).

MACRATRIA Newn.

- M. murina* Newn. G. d., on willow (Bf), Ocean Co., rather common.

NOTOXUS Geoffr.

- N. bicolor* Say. Highlands, VI, Spring Lake, IX (Ch), Sea Girt (Bf), Westville, I, 28 and g. d. (W).
N. bifasciatus Lec. Orange, VI (Ch), Newark, g. d. (Bf), Atco (W, Li), Clifton; locally common.
N. planicornis Laf. Anglesea, throughout the season, most abundant sweeping in the early evening.
N. monodon Fabr. Common throughout the State.
 var. delicatus Casey. Brigantine beach, IX (Hn).
N. anchora Hentz. Hopatcong (Pm), Newark, at light (Bf), Ocean Co.; not common anywhere.

MECYNOTARSUS Laf.

- M. flavicans* Casey. Hopatcong (Pm), Hackensack River, V, 8 (Bf), Westville (Li), g. d., near the Delaware river in white sand, nocturnal (W).

TOMODERUS Laf.

- T. interruptus* Laf. Newark, at edge of meadows in early spring (Bf).
T. constrictus Say. Newark (Dkn), salt meadows (Bf), "New Jersey" (Lg).

ANTHICUS Payk.

- A. formicarius* Laf. Brigantine beach, IX (Hn), Anglesea, VII (Sz), sea-shore (W) ; common.
- A. cinctus* Say. Arlington (Bf), Anglesea, VII (Sz).
- A. rejectus* Lec. Brigantine beach, IX (Hn).
- A. floralis* Linn. Ft. Lee (Bt), Newark (Lœffler), seashore, common (W), Anglesea, VII, 23.
- A. difficilis* Lec. Hopatcong (Pm), Orange, VI (Ch), Arlington in early spring, rare (Bf), Anglesea, VII (Sz).
- A. confusus* Lec. Union, rare (Bf), Anglesea (W).
- A. scabriceps* Lec. Newark (Bf).
- A. cervinus* Laf. Union, in early spring not rare at base of trees (Bf), sea-shore, not rare (W).
- A. haldemanni* Lec. Orange, VI, at light (Ch).
- A. spretus* Lec. Anglesea, VII (Sz).
- A. pubescens* Lec. "New Jersey" (Dkn).
- A. fulvipes* Laf. Newark, II, 12, Arlington, salt meadows, common (Bf).
- A. pallens* Lec. Lake Hopatcong (Pm), Brigantine beach, IX (Hn), Anglesea, VII (Sz), seashore, not rare (W).

Family PYROCHROIDÆ.

Rather large, flattened beetles, bright blue, black or orange in contrast, thorax narrower than the elytra, the latter not very hard in texture and somewhat widening posteriorly. The antennæ are either strongly serrated or, in the males, with long comb-like processes. The beetles are usually rather rare, are found about dead or decaying trees and in these live the larvæ, which have a broad head, stout legs and two spines on the last abdominal segment.

None are of economic importance.

ISCHALIA Pasc.

- I. costalis* Lec. Woodbury, XII, 3, 10, by sifting old leaves in a swamp (W).

PYROCHROA Geoff.

- P. flabellata* Fabr. Hopatcong (Pm), Greenwood Lake, VI, Ft. Lee (Bt), Caldwell (Cr), Orange Mts., g. d. (Bf).
- P. femoralis* Lec. Greenwood Lake, Ft. Lee (Bt), g. d., rare (W).

DENDROIDES Lec.

D. canadensis Latr. Hopatcong (Pm), Palisades, VII, bred (Lv), Caldwell (Cr), Orange Mts., West Bergen, under bark (Bf).

Family MELOIDÆ.

Contains the "oil beetles" and "blister beetles." They are soft in texture, usually slender and cylindrical, the thorax narrower than either head or elytra. The antennæ are moderate in length, sometimes curiously knotted or otherwise modified in the male, and the insects are as a whole loose-jointed and sprawly in appearance. They vary in color, and are often striped or spotted sometimes metallic and occasionally banded. In the adult stage they feed on plant tissue, and are sometimes seriously harmful. One of them is known as the "old fashioned potato beetle," and this frequently comes in swarms in late summer, occasionally with or replaced by an ally, and it, or they, sweep through a garden or field before the farmer realizes the nature of the attack. They especially favor beets and certain compositæ when in flower, a black species occurring in swarms locally on the golden-rod. As a rule they disappear as suddenly as they come, some species being found in swarms on one day only. Others remain a week or two, and are then best gathered into kerosene pans, if at all possible. The arsenites kill them slowly, and a swarm that feeds for a day or two before application is made and a day or two before the specimens die has done about as much injury as would have been caused without treatment of any kind. Driving them off is sometimes practiced with fair success, and may be resorted to when circumstances favor the method.

Curiously enough, many of these insects are markedly beneficial in the larval stage, since they form one of the most important checks to grasshopper increase. The eggs are laid in a variety of places, but always the young active creatures that hatch from them hunt up a grasshopper egg-pod and reach their full development there. A season when grasshoppers have been unusually abundant is almost certain to be followed by one in which blister beetles become destructive, while grasshopper increase depends upon droughty conditions in late summer.

The life cycle is interesting, and some of the species live in the nests of bumble and other bees, hence are injurious in this stage also.

MELOE Linn.

M. angusticollis Say. Madison (Pr), Caldwell (Cr), g. d., late in fall on wild turnips (Bf).

M. americanus Leach. Newark (Soc), Orange Mts., rare (Bf).

NEMOGNATHA Ill.

N. nemorensis Hentz. Eastern New Jersey (Dietz).

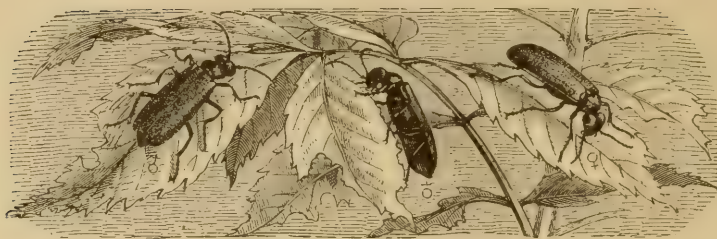


Fig. 146.

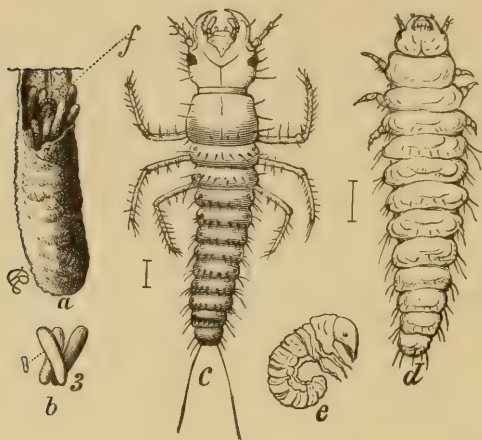


Fig. 148.



Fig. 147.



Fig. 151.



Fig. 152.

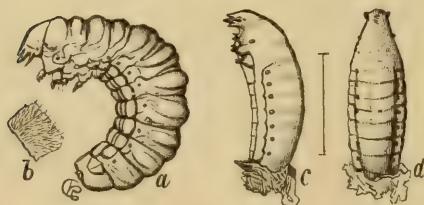


Fig. 149.

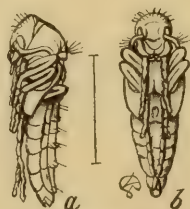


Fig. 150.

Fig. 146.—The "Spanish fly," *Lytta vesicatoria* : not a native of this country.

Fig. 147.—The "striped blister beetle," *Epicauta vittata*.

Fig. 148.—Early stages of blister beetles; *a*, grasshopper egg-pod with the triungulin at *f*; *b*, grasshopper eggs, enlarged; *c*, triungulin; *d*, carabidoid stage of larva; *e*, scarabidoid stage of larva: enlarged.

Fig. 149.—Striped blister beetle; *a*, scarabidoid larva; *c*, *d*, coarctate larva: enlarged.

Fig. 150.—Striped blister beetle; *a*, *b*, true pupa from side and beneath: enlarged.

Fig. 151.—Margined blister beetle, *Epicauta cinerea*.

Fig. 152.—Ash-gray blister beetle, *Macrobasis unicolor*; *b*, black blister beetle *Epicauta pennsylvanica*: enlarged.

ZONITIS Fabr.

Z. bilineata Say. Madison, VIII, 5 (Pr), Orange Mts. (Bf), Staten Island (Lg).

MACROBASIS Lec.

M. unicolor Kirby. Occurs throughout the State, VI, VII, sometimes commonly, often on *Baptisia tinctorum*, not rarely on potatoes.

EPICAUTA Redt.

E. trichrus Pall. Westville, rare (Li), Eastern New Jersey (Dietz); beetle feeds on sweet potatoes, on wild *Convolvulus* and on May-weed (*Maruta cotula*) in August; but not common (Ch).

E. vittata Fabr. Throughout the State; often destructive in late summer to potatoes and other garden crops or to flowers: the "old fashioned" potato beetle.

E. cinerea Först. Throughout the State in August, with much the same habits as the preceding; but not so often injurious: both of these species are more common north of the middle of the State.

E. pennsylvanica DeG. Throughout the State, late, VIII and IX, common on *Solidago*.

POMPHOPCEA Lec.

P. ænea Say. Woodside (Bf), Westville (Li), Anglesea (W), adult sometimes injurious to blossoms of fruit trees (Ch); in New Jersey I have seen this only in isolated specimens in early spring, and it probably occurs throughout the State.

P. sayi Lec. Greenwood Lake, VI (Beyer).

Family RHIPIPHORIDÆ.

Contains wedge-shaped or clumsy, almost shapeless forms, with short, sometimes pointed wing-covers, beyond which the hind wings sometimes project so as to cover the abdomen. The head is bent down, the antennæ are serrated in the female and flabellate in the male. The adults are rare, occur on flowers, and the larvæ are parasitic, some in the nests of wasps, and some on cockroaches.

RHIPIPHORUS Fabr.

- R. flavipennis* Lec. G. d., rare (W).
R. dimidiatus Fabr. Hudson Co. (Ll), g. d., rare (W), Jamesburg, River-
 ton, VII, 25.
R. pectinatus Fabr. Caldwell (Cr), Orange Mts, Newark (Bf), g. d. (W),
 So. Jersey, VI, 21; always rare.
R. limbatus Fabr. Palisades, VII, 26 (Lv), Orange Mts., Newark (Bf), g.
 d., rare (W).
R. linearis Lec. Madison, VII, 17 (Pr).

MYODITES Latr.

- M. fasciatus* Say. Orange Mts. (Bf), Eastern New Jersey, rare (Dietz).

Family STYLOPIDÆ.

This family is represented in our State by a single species only, which has been denied a place in the order. It is exceedingly minute, the male only is winged, lives for only a very short time; the female never leaves the body of the paper wasp in which the species is parasitic.

Our only species is

XENOS Rossi.

- X. peckii* Kirby. I have taken *Polistes* with the head of this species project-
 ing between the abdominal rings occasionally, in all parts of the State.

RHYNCHOPHORA.

The remaining families in the order belong to the series *Rhynchophora*, or snout beetles, sometimes classed as a sub-order, also termed curculios or weevils. Their chief character is expressed by the name, i. e., the head is prolonged into a beak or snout, at the end of which the mouth parts are situated. This beak or snout varies much in length, and is sometimes so short that it would hardly be noticeable. The thorax is cylindrical, however, without seam or suture at the sides, and the tarsi or feet have the joint before the last lobed, which character will usually serve to identify the series when the mouth structure leaves it in doubt. It may be generally said that all the species are plant feeders, and are or may be injurious.

The larvæ are white, much wrinkled, stout, fleshy grubs, usually without legs, with a yellowish head, and they tend to curl up like a "white grub." These also are vegetable feeders as a rule, and many of them are great pests. There are a number of families of the snout beetles based on good structural characters, but which are not readily separable by the amateur. No attempt at definition will be made, therefore, with most of them, and individual genera or species will be commented upon where necessary.

Family RHINOMACERIDÆ.

RHINOMACER Fabr.

R. pilosus Lec. Gloucester, rare on dying pine IV and V (W).

R. elongatus Lec. Gloucester (W), Westville (Li), Morristown, on pine (Jl).

Family RHYNCHITIDÆ.

AULETES Sch.

A. ater Lec. Landisville, DaCosta (Li), Anglesea (W), Ft. Lee on sweet fern (Jl).

A. cassandræ Lec. Buena Vista (Li), Anglesea, V, 28.

EUGNAMPTUS Sch.

E. angustatus Hbst. Newark district, g. d., on oak in early spring (Bf), Madison, VII, 24, on hickory and butternut (Pr), Orange, VI, on sycamore, butter-hickory- and chestnut (Ch), Ft. Lee, hickory (Bt), g. d. (Li), on hickory (W), Anglesea, V, 28, Jamesburg, VI.

E. collaris Fabr. DaCosta, Anglesea, V, VII, on scrub oak (W), Ft. Lee, hickory (Bt), Hopatcong (Pm), South River, VII, 8, New Brunswick.

RHYNCHITES Hbst.

R. bicolor Fabr. Common throughout the State, VI and VII, on rose.

R. hirtus Fabr. Atlantic, Cape May Co., V, 26 (W), DaCosta (Li), Orange Mts., Woodside, Newark on oak (Bf), Bergen (Jl), Anglesea, V, 28.

R. cyanellus Lec. Highlands, abundant, VI (Ch).

R. æratus Say. Hopatcong, feeding on wild sunflower (Bt), Hemlock falls, Jamesburg, VII (Bf), Bloomfield (Jl), Spring Lake (Ch), Landisville (Li), Anglesea, V, 28, DaCosta, Cape May Court House, V, 26, on scrub oak (W).

PTEROCOLUS Sch.

P. ovatus Fabr. Ft. Lee (Bt), Orange Mts., on oak, once common (Bf), Newark, Orange, Ft. Lee, on oak (Jl), Atco, Camden, on scrub oak (W), g. d. (Li), Jamesburg, VII, 15.

Family ATTELABIDÆ.

ATTELABUS Linn.

A. analis Ill. Chester (Dkn), Ft. Lee (Bt), Caldwell (Cr), Orange Mts., Newark (Bf), g. d. (Li), Jamesburg, VII, 15, Anglesea, V, 28: lives on sumach (Jl).

- A. nigripes* Lec. Atlantic, Cape May Co., on scrub oak (W), g. d. on oak (Bf).
A. bipustulatus Fabr. Ft. Lee (Bt), Atlantic, Cape May Co. (W), g. d. (Li), Ocean Co., on oak, Anglesea, V, 28, Jamesburg, VIII, 15.
A. rhois Boh. Milburn (Bt), Orange, on hazel (Jl), Newark (Bf), Ocean Co., on sumach, New Brunswick, VII, 7, Jamesburg, VII, 15, Anglesea, V, 28, VII, 23.
-

Family OTIORHYNCHIDÆ.

EPICÆRUS Sch.

- E. imbricatus* Say. Camden (Li), g. d. (W); the adult is the imbricated snout beetle which feeds on orchard and small fruits as well as a great variety of vegetables, sometimes doing considerable injury. It has not been notably harmful in New Jersey, however.

HORMORUS Horn.

- H. undulatus* Uhler. West Hoboken (Jl), Newark district, g. d., under stones early in spring, rare (Bf).

ANAMETIS Horn.

- A. grisea* Horn. Newark (Soc); lives under bark of apple and pear (Riley). This record is open to doubt, since I have been unable to see the specimen or to fix responsibility for the name.

PANSCOPUS Sch.

- P. erinaceus* Say. Woodbury, III, 25, sifting old leaves (W), salt meadows, III, 19 (Bf), on wild grape, VI and VII.

PHYXELIS Sch.

- P. rigidus* Say. Newark district, early in Spring (Bf), Weehawken (Bt), Madison (Pr), Hopatcong (Pm), Camden (Li), g. d. (W).

AGRAPHUS Say.

- A. bellicus* Say. Hopatcong (Pm), Newark (Soc), Sandy Hook (Bf), Shrewsbury (Jl), Anglesea (W).

OTIORHYNCHUS Germ.

- O. sulcatus* Fabr. Newark, Orange Mts., Eagle Rock (Bf), Hopatcong (Pm), Ft. Lee (Bt), So. Jersey, under hemlock bark (W): larval habits as in *ovatus*, but does no serious injury.

O. ovatus Linn. Hopatcong (Pm), Ft. Lee (Bt), Newark district, g. d. (Bf), g. d. (Li): larva girdles the crown of strawberry and becomes the "crown girdler"; adult is a general feeder.

O. rugifrons Gyll. Ft. Lee, V, under stones, V (Bf), Eastern New Jersey (Dietz, det Linell).

CERCOPEUS Sch.

C. chrysorrhœus Say. Hopatcong (Pm), Ft. Lee (Sf), Newark district, Irvington, Union, early in spring (Bf), Orange (Jl), Palmyra under bark of chestnut stumps (W).

TANYMECUS Sch.

T. confertus Gyll. Ft. Lee (Bt), Hudson Co (Ll), common in early Spring under stones, Newark district (Bf), g. d. (W, Li), Monmouth Co., VII, 2: is polyphagus in habit and feeds on a great variety of plants.

PANDELETEJUS Sch.

P. hilaris Hbst. Throughout the State: in the trunks of white oak and also on beech.

BRACHYSTYLUS Sch.

B. acutus Say. Newark (Soc), So. Jersey on persimmon (W): confined to the persimmon (Sz).

ARAMIGUS Horn.

A. fulleri Horn. Fuller's rose-beetle; a pest in the rose houses of Union and adjoining counties, the larvæ at the roots; less troublesome now than in the recent past, the beetle not common outdoors and not originally a native of the State.

APHRASTUS Gyll.

A. tæniatus Gyll. Throughout the State on Pawpaw, hazel and other bushes, in July.

CYPHOMIMUS Horn.

C. dorsalis Horn. Ft. Lee, on *Prunus virginica* (Jl), Hudson Co. (Ll).

SCIAPHILUS Steph.

S. asperatus Bond. Hopatcong (Pm).

STROPHOSOMUS Steph.

S. coryli Fabr. Orange Mts., on *Betula lenta* (Jl).

Family CURCULIONIDÆ.**SITONES Sch.**

- S. hispidulus* Germ. Throughout the State, May to October ; the larva on roots of clover. While this is sometimes common enough locally, I have not yet found it in sufficient abundance to do any actual injury ; it is as yet only potentially destructive.
- S. flavescens* Marsh. Hudson Co. (Li), salt meadows early in Spring (Bf), g. d. (W).
- S. crinitus* Oliv. "New Jersey" (Jl).

PLINTHODES Lec.

- P. tæniatus* Lec. Orange Mts., on alder (Bt).

ITHYCERUS Sch.

- I. noveboracensis* Forst. Throughout the State, though hardly common : breeds in twigs of white and burr oaks ; but also found on hickory and beech.

APION Hbst.

- A. impeditum* Fall. Peekskill, N. Y. to D. C. (Fall), and certain to occur with us.
- A. impunctistriatum* Sm. Anglesea (W), Hemlock Falls, rare (Bf).
- A. atripes* Sm. South Camden (W).
- A. finitimum* Fall. South Camden (W), Newark (Li).
- A. melanarium* Gerst. Camden (W, Li), Hemlock Falls (Bf), Anglesea, V, 28, New Brunswick, VII, 20.
- A. minutum* Sm. Gloucester (W).
- A. pennsylvanicum* Boh. Anglesea (Li), and probably throughout the State.
- A. perminutum* Smith. South Camden (W), Camden, N, 10.
- A. reclusum* Fall. Anglesea (Li).
- A. patruelle* Smith. Anglesea, V, 27, and other dates (W, Li, Sm), Arlington meadows, early in Spring, under stones (Bf, Dkn).
- A. walshii* Sm. Jamesburg (W).
- A. perforicolle* Fall. Southern New Jersey, along the coast (Fall), DaCosta (W), Atco, Buena Vista (Li).
- A. turbulentum* Smith. New Jersey (Li), Hopatcong (Pm), Arlington (Bf) : on *Vaccinium stramineum* (Hn).
- A. griseum* Smith = *fraternum* Sm. DaCosta (W), Newark, g. d., Jamesburg, VII (Bf), Anglesea, V, 28 : on *Phascolus* (Riley), on the leaves of *Lespedeza*, VII and VIII (Ch).

- A. porcatum* Boh. Newark district, rare in early spring, on locust (Bf).
- A. rostrum* Say. South Jersey, Cape May Court House (W), Clifton, V (Ch), Anglesea, V, 28, New Brunswick, VII, 7, Jamesburg, VII, 15, Newark: on wild indigo, in the seeds of which it breeds.
- A. nigrum* Hbst. New Jersey, common on locust (Fall), Hemlock Falls, rare (Bf), Clifton, Orange, V and VI, breeds in seeds of *Robinia pseudacacia* (Ch).
- A. segnipēs* Say. Gloucester Co., common (W), Anglesea, V, 28: breeds in seeds of *Astragalus* and *Tephrosia virginiana* (Ch).
- A. decoloratum* Sm. Camden and Gloucester Co., Cape May Court House (W), Southern New Jersey.
- A. emaceipes* Fall. Vermont to Maryland and probably confused with the preceding in New Jersey collections.
- A. spinipes* Fall. Da Costa (W), Anglesea VII, 23.
- A. parallelum* Smith. Southern New Jersey (W), Buena Vista (Li).
- A. puritanum* Fall. "New Jersey" (Fall), South Jersey (W).
- A. herculanum* Smith. "New Jersey."

This and the preceding are so closely related that I considered them indetical, and both occur with us. On *Viburnum acerifolium* going out of bloom in June (Hn).

PODAPION Riley.

- P. gallicola* Riley. Forms galls on *Pinus inops* and *P. rigida* from Massachusetts to District of Columbia, Florida and California and will undoubtedly be found in New Jersey.

PHYTONOMUS Sch.

- P. punctatus* Fabr. The "clover leaf beetle," common throughout the State in June, the larva sometimes threatening severe injury; but hitherto controlled by a fungus disease.
- P. comptus* Say. Hopatcong (Pm), Newark district (Bf), Hudson Co. (Ll), Ft. Lee (Sf), Westville (Li), IV, 26 (W), on *Polygonum*.
- P. nigrirostris* Fabr. Hopatcong (Pm), Madison, VI, 1 (Pr), Hudson Co. (Ll), Newark (Soc), Communipaw (Jl), Westville, common during winter, sifting, and the specimens are then a beautiful green (W), New Brunswick, VII, 6.

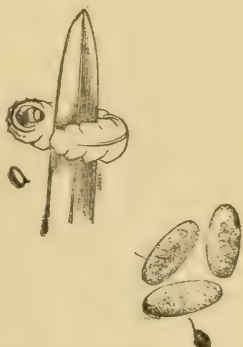


Fig. 154.—Diseased larva of clover leaf beetle; fungus spores enlarged.

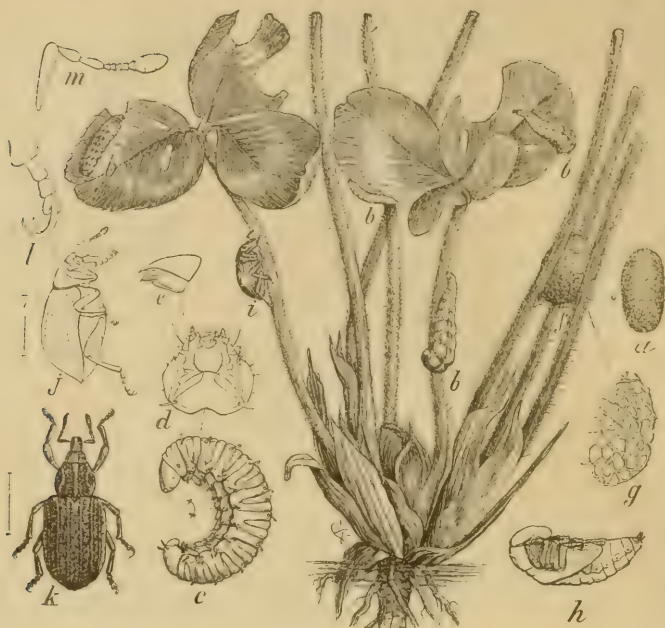


Fig. 153.—Clover leaf beetle, *Phytonomus punctatus*: *a*, egg, enlarged; *b*, *b*, larvæ feeding; *c*, larva, enlarged; *d*, *e*, head and mandible yet more enlarged; *f*, cocoon; *g*, same, enlarged, to show its net-like character; *h*, pupa; *i*, beetle on clover stalk; *j*, beetle in outline from side; *k*, beetle, enlarged; *l*, *m*, foot and antennæ of beetle, yet more magnified.

LISTRONOTUS Jek.

- L. sordidus* Gyll. "New Jersey." All the species whose habits are known, feed on *Sagittaria* or other aquatic plants (Ch).
- L. tuberosus* Lec. Gloucester Co. (W).
- L. squamiger* Say. Gloucester (W), Newark district, g. d. (Bf), Orange, VI (Ch).
- L. callosus* Lec. Hudson Co. (Ll).
- L. inæqualipennis* Boh. Hopatcong (Pm), Hudson Co. (Ll), Newark, Waverly, salt meadows (Bf).
- L. caudatus* Say. Newark (Dkn).
- L. appendiculatus* Boh. Newark district, g. d. (Bf), Atco, Westville, I, 28, common in winter, sifting (W).
- L. nebulosus* Lec. Eastern New Jersey (Dietz det. Linell).
- L. frontalis* Lec. Hopatcong (Pm), Newark, g. d. (Bf).
- L. latiusculus* Boh. Madison (Pr), Hudson Co. (Ll), salt meadows (Bf), Gloucester, Camden Co. (W): breeds in stalks and seed heads of *Sagittaria variabilis* (Ch).

- L. setosus* Lec. Hopatcong (Pm).
L. teretirostris Lec. "New Jersey" (Jl).

MACROPS Kirby.

- M. solutus* Boh. Newark, common on pickerell weed (Bf), Camden, Gloucester Co., common in winter, sifting (W), g. d. (Li).
M. indistinctus Dietz. "New Jersey" (Dietz and U S N M), Newark (Li).
M. delumbis Gyll. Newark, Bloomfield, VIII, 12 (Bf), Hopatcong (Pm).
M. sparsus Say. Hopatcong (Pm), Bloomfield, VIII, 12, Newark, g. d. (Bf).
M. obscurellus Dietz. Newark, Irvington (Bf), Brooklyn, Long Island (U S N M).
M. humulis Gyll. Brigantine beach, IX (Hn), Salt meadows, III, 19 (Bf), Ocean Co., V.
M. porcellus Say. Newark (Bf).

PISSODES Germ.

- P. strobi* Peck. Throughout the State, more or less common, and sometimes injurious to pine and spruce: known as the white pine weevil: no practical remedy is known save to cut and destroy the infested shoots.

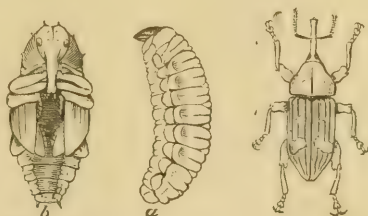


Fig. 155.—White pine weevil, *Pissodes strobi*: a, its larva; b, pupa; enlarged.

PACHYLOBIUS Lec.

- P. picivorus* Gem. Brigantine beach, IX (Hn), g. d. (W, Li), Lahaway, X, 11: on pine.

HYLOBIUS Germ.

- H. pales* Hbst. Throughout the State, IV and V; breeds under pine bark.
H. confusus Kirby. Newark, one specimen, on blackberry blossoms (Bf).

EUDOCIMUS Sch.

- E. mannerheimi* Boh. Hackensack meadows (Bt), was once abundant near Hoboken, years ago (Ch), Anglesea, one specimen only (W).

LIXUS Fabr.

- L. sylvius* Boh. Ft. Lee (Li, Julich, Bt).
L. terminalis Lec. Hudson Co. (Li), Newark district (Bf), Westville (Li), g. d. (W).
L. rectus Lec. Arlington (Jl).
L. concavus Say. Throughout the State: breeds in stalks of sunflower, dock, rhubarb, thistle, etc.

L. jülichii Casey. Arlington meadows in early spring (Bf).

L. musculus Say. Hudson Co. (Ll), Newark, edge salt meadows (Bf), Westville (Li), Camden, Gloucester Co. (W).

DORYTOMUS Steph.

D. mucidus Say. "New Jersey" (Jl).

D. laticollis Lec. Guttenberg, on poplar (Jl).

D. brevicollis Lec. Hudson Co. (Ll), on pussy willows (Bf), Orange Mts., V, 30 (W).

ERYCUS Tourn.

E. puncticollis Lec. Hopatcong (Pm), Hudson Co. (Ll), Hoboken (Jl), Newark, salt meadows early in spring (Bf), Snake Hill, III, IV (Sf).

PACHYPHANES Dietz = BARYTICHIUS.

P. amœnus Say. Hopatcong (Pm), Newark district, g. d., VII. VIII (Bf), Anglesea (W); on rag-weed (Hn).

DESMORIS Lec.

D. constrictus Say. Eastern New Jersey (Dietz, det. Ll).

D. flavicans Lec. Clementon, VIII, 6 (W).

SMICRONYX Sch.

S. nebulosus Dietz. "New Jersey" (Dietz).

S. corniculatus Fabr. Hemlock falls (Bf), Ocean Co. (Lg), Newark, V, 30.

S. griseus Lec. Hudson Co. (Ll), Snake Hill, Orange Mts., Newark (Bf), Ft. Lee, on rag-weed (Bt), Spring Lake, VIII (Ch).

S. squammulatus Lec. Anglesea (W).

PHYLOTROX Sch.

P. ferrugineus Lec. Highlands, VI (Ch), Anglesea, VII (Sz).

BRACHYBAMUS Germ.

B. electus Germ. Hopatcong (Pm), salt meadows, V, 17 (Bf).

ONYCHYLIS Lec.

O. nigrirostris Boh. Hopatcong (Pm), Newark, on *Sagittaria*, V, 30 (Bf).

ENDALUS Lap.

E. limatulus Gyll. Hoboken, salt meadows (Jl), Newark, Snake Hill V (Bf).

E. ovalis Lec. Salt meadows, under stones, early spring (Bf).

TANYSPHYRUS Sch.

T. lemnæ Fabr. Hudson Co. (Ll), Hoboken, V, 31, salt meadows (Jl), Orange, VI (Ch), Newark, salt meadows, V, 30 (Bf), adhering to pieces of board anchored in water (W).

ANCHODEMUS Lec.

A. angustus Lec. Hoboken, salt meadows (Jl), Camden, Gloucester, on Delaware river front in marshes, VI, 10 (W): breeds in *Sagittaria* (Harrington).

LISSORHOPTRUS Lec.

L. apiculatus Gyll. Camden, Gloucester Co., in swamp (W), g. d. (Li), Jamesburg, IV, 18.

L. simplex Say. Hudson Co. (Ll), Hoboken, salt meadows (Jl); breeds in roots of rice (Riley).

BAGOUS Germ.

B. obliquus Lec. Hudson Co. (Ll), New Jersey (Jl).

B. americanus Lec. Beesleys Point, VI, 30 (W).

B. magister Lec. Hudson Co. (Ll), Newark (Bf), Ft. Lee, lily pond (Sf).

OTIDOCEPHALUS Chevr.

O. myrmex Hbst. "New Jersey" (Jl), Hudson Co. (Ll), g. d. (W, Li): the species are inquilineous in Cynipid galls.

O. scrobicollis Boh. Hopatcong (Pm), Orange Mts. (Bf), Hudson Co. (Ll), Cape May Court House, V, 26, g. d. (W).

O. chevrolatii Horn. Hopatcong (Pm), Hudson Co. (Ll, Jl), Jamesburg VII, 4 (Lv), Cape May Court House, V, 26, g. d. (W): on elm and hickory.

O. lævicollis Horn. Orange Mts. (Bf), Hudson Co. (Ll, Jl): bred from Cynipid gall on oak (Riley).

MAGDALIS Germ.

M. perforata Horn. G. d., rare (W), Ft. Lee (Sf): on pine (U).

M. cuneiformis Horn. = *lecontei*. New Jersey, one specimen (W), g. d. (Li).

M. barbata Say. Newark, in shell bark hickory (Bf), Caldwell (Cr), g. d. (W): breeds in fallen hickory.

M. olyra Hbst. Orange Mts. (Bf), Hudson Co. (Ll), g. d. (W), Atlantic City, Anglesea: breeds under bark of hickory (Ch).

M. inconspicua Horn. Hopatcong (Pm).

M. pandura Say. Newark, Orange Mts. (Bf), Westville (Li), seashore counties (W).

M. armicollis Say, female = *pallida* Say, male. Newark district on elm (Bf), Atlantic City (Castle), New Jersey (Jl), g. d. (W), New Brunswick in July : breeds in elm (Ch).

TACHYPTERUS Dietz.

T. quadrigibbus Say. Throughout the State on fruit trees : larva feeds in apple and pear, around the core, rarely injurious.

ANTHONOMUS Germ.

A. scutellaris Lec. "New Jersey," without definite locality.

A. elegans Lec. Orange Mts., V, 30 ; "one specimen, taken by myself, open to doubt" (W).

A. hamiltoni Dietz. Hemlock falls, sweeping (Bf), Buena Vista (Li), Da Costa, VIII, 14, Red Bank, Gloucester Co., V, (W).

A. pusillus Lec. Hopatcong (Pm), Hemlock Falls (Bf), Buena Vista (Li), Clementon, V, 30, Atco (W).

A. profundus Lec. Westville, Buena Vista (Li), Newark, VI, 9, on huckleberry blossoms (Bf).

A. nebulosus Lec. Orange Mts., rare (Bf).

A. sycophanta Walsh. Newark district, g. d. (Bf), South Jersey, on willow (W) : breeds in the galls made by a saw-fly on willow.



Fig. 156.—Strawberry weevil and its work : *a*, shoot of strawberry plant bearing punctured buds, *b*, enlarged eggs at *c*; at *d*, larva, *e*, its head, much enlarged; *f*, pupa, enlarged; *g*, open strawberry flower showing work of the beetles.

- A. suturalis* Lec. Anglesea, VII, 1, and g. d. (W), Newark, Orange Mts. (Bf): said to feed on cranberry in the larval stage, and also on wild plum.
- A. flavicornis* Boh. Anglesea, VII, 11, Da Costa (W).
- A. morulus* Lec. Anglesea, VII, 11 (W).
- A. corvulus* Lec. Cape May Court House, V, 26, Anglesea (W), Hemlock falls, Eagle rock, Orange Mts. (Bf).
- A. signatus* Say. Orange Mts. and southward; probably throughout the State, though much more common in the southern counties. It is the strawberry weevil and always does some and occasionally severe injury in Atlantic, Cumberland and Burlington counties: feeds also on black-dew- and raspberry, red-bud and *Potentilla* (Ch). Plant pistillate varieties so far as possible with some full flowering, perfect flowering variety as a pollinizer.
- A. musculus* Say. Atco, Anglesea, VII, g. d. (W), Newark district, g. d. (Bf), Hopatcong (Pm), found on huckleberry (Hu).
- A. nigrinus* Say. New Jersey, on horse nettle, *Solanum virginianensis* (W), Staten Island (Lg).
- A. scutellatus* Gyll. Da Costa (Li), Anglesea (W), Newark district, g. d. (Bf), Hopatcong (Pm).
- A. juniperinus* Sanb. Anglesea (Lg), Bayside, IX, 22, on Juniper (W), feeds in the Juniper fungus (U).
- A. rufipes* Lec. Buena Vista (Li).
- A. disjunctus* Lec. Gloucester Co. (W), Atlantic City (Castle), "New Jersey" (Horn, Dietz).
- A. latiusculus* Dietz. Anglesea, V, 30, on holly (W, Li, Lg).
- A. robustulus* Lec. Jamesburg, VII, 4 (W), VII, 15 (Sm), Hopatcong (Pm).
- A. unguicularis* Lec. "New Jersey" (Jl): in *Cassia marylandica* (U).
- A. nubilus* Lec. Anglesea (W), Orange Mts. (Bf), "New Jersey" (Li).
- A. elongatus* Lec. Anglesea, Newark (W), Snake Hill, V, 17, 28, VI, 28 (Bf), "New Jersey" (Li, Lg).
- A. phelvolus* Boh. Hudson Co. (Li), "New Jersey" (Jl). Dr. Dietz lists this as an unrecognized species, and the determination may be erroneous.



Fig. 157.—Strawberry weevil, *Anthrenus signatus*: enlarged.

ANTHONOMOPSIS Dietz.

- A. mixtus* Lec. Generally distributed, rare (W).

PSEUDANTHONOMUS Dietz.

- P. crataegi* Walsh. Anglesea, V, 30, Westville, VII, 20 (W).

P. incipiens Dietz. Occurs with the preceding and probably confounded with it in collections.

P. longulus Dietz. Jamesburg, VII, 4 (Bf).

NEOMASTIX Dietz.

N. solidaginis Dietz. Atco, Clementon (W), Buena Vista (Li): occurs "on deflorescent flower heads of *Solidago* species (Dietz).

NANOPS Dietz.

N. schwarzi Dietz. South Jersey (W), Buena Vista (Li).

ELLESCHUS Steph.

E. bipunctatus Linn. "New Jersey" (Jl); an European species, introduced, and not widespread.

E. ephippiatus Say. Westville, common (W), Bloomfield, Newark (Bf), Lahaway, V, 28, on cranberry bog; occurs on willow, probably throughout the State.

ORCHESTES Ill.

O. ephippiatus Say. Bloomfield (Bf), Westville (W), on *Salix fragilis* (Bt): all the species are leaf miners on *Salix* sp. (U).

O. salicis Linn. Newark (Bf), sub nom. *subhirtus* Horn, determined by comparison with the type: apparently an introduced species.

O. niger Horn. "New Jersey" (Jl), Newark district (Bf), on low willows in July (Ch).

O. canus Horn. Staten Island (Lg).

O. pallicornis Say. South Jersey (W), Newark district (Bf), on low willows in July (Ch).

XANTHUS Dietz.

X. pygmæus Dietz. Anglesea (Li, Lg), V, 28 (W), on Juniper (U).

ACALYPTUS Sch.

A. carpini Herbert. "New Jersey" (Dietz, Lg), Hopatcong (Pm), Orange Mts., V, 13, 30 (Bf).

PRIONOMERUS Sch.

P. calceatus Say. Hopatcong (Pm), Orange Mts., VI, 2 (Bf), seashore (Li), Westville, V, 16, Anglesea, VI, 16 (W), Jamesburg, VII, 14: larva mines leaves of sassafras (U).

PIAZORHINUS Sch.

P. scutellaris Say. Hudson Co. (Ll, Jl), Anglesea (W), V, 28 (Sm), g. d. (Li).

P. pictus Lec. Hopatcong (Pm), Orange Mts. (Bf), Shrewsbury (Jl), Anglesea, DaCosta (W), always rare.

THYSANOCNEMIS Lec.

T. fraxini Lec Hopatcong (Pm), Eagle Rock, on ash (Bf), Ft. Lee, VI, on *Cephalanthus occidentalis* (Bt), Gloucester, in a hard fungus, also on blossoms of ash (W), Westville (Li), Atlantic City (Castle): lives in seeds of *Fraxinus* (U).

T. helvolus Lec. South Jersey, rare (W).

PLOCETES Lec.

P. ulmi Lec Hopatcong (Pm), Hudson Co. (Ll), Ft. Lee, VII (Sf), Newark district (Bf), Westville (Li), Gloucester, Anglesea, VI, 30 (W), Atlantic City (Castle), nowhere common: lives in button-bush (U).

TYCHIUS Sch.

T. sordidus Lec. Anglesea, one specimen (W).

GYMNETRON Sch.

G. teter Fabr. Common throughout the State, V and VI, on Mullein.

MIARUS Steph.

M. hispidulus Lec. Hopatcong (Pm), Orange Mts. (Bf), Newark (Soc), Plainfield (Sf): in seed capsules of *Lobelia* Sp.

LÆMOSACCUS Sch.

L. plagiatus Sch. Ft. Lee (Bt), Newark district (Bf), Hudson Co (Ll), Anglesea, VII, 4 (W, Lv), g. d. (Li), Lahaway, Jamesburg, VII, 15, always on oak, and usually abundant: on hickory (Ch).

CONOTRACHELUS Sch.

C. juglandis Lec. Hopatcong (Pm), Newark district, VI, 23 (Bf), Ft. Lee (Bt), Hudson Co. (Ll), g. d. (W); breeds in green fruit of butternut (Ch), and also recorded on walnut.

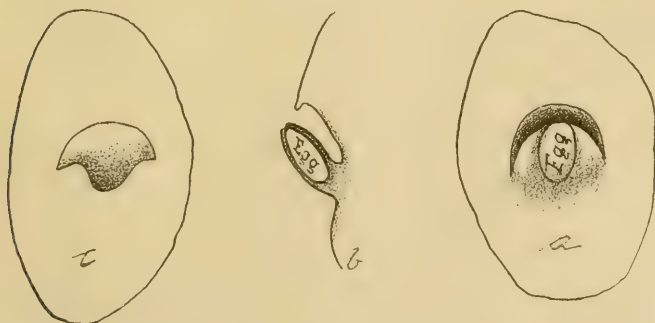


Fig. 157a —Egg punctures of plum *Curculio*, much enlarged, showing location of egg in the flap at a; a section of same at b; flap removed with egg at c.

- C. nenuphar* Hbst. The plum curculio: common throughout the State and destructive to plum and peach, seriously injurious to other fruits: remedies are jarring the beetles from the trees, picking up and destroying the dropped fruits.
- C. seniculus* Lec. Woodbury, VIII, 8 (W).
- C. elegans* Say. Hopatcong (Pm), Hudson Co (Ll), Newark district (Bf), Orange, Highlands, VI, Spring Lake, IX, reared from larvæ feeding on underground stems of *Amaranthus retroflexus* (Ch).
- C. aratus* Germ. Atlantic Co., rare (W).
- C. cratægi* Walsh. The quince curculio; occurs everywhere, but not commonly, though it is sometimes locally injurious.
- C. naso* Lec. Atlantic Co., rare (W), on *Cratægus* (Hn).
- C. posticatus* Boh. Hudson Co. (Ll), Newark district (Bf), Orange, VI (Ch), Atlantic Co. (W).
- C. geminatus* Lec. Bloomfield, locally common (Bf), Hopatcong (Pm), Hudson Co (Ll), Westville, rare (Li), Atlantic Co., rare (W), Sandy Hook, VII.
- C. cribricollis* Say. Westville, I, 28, sifting (W).
- C. anaglypticus* Say. Throughout the State in June: in walnut.
- C. fissunguis* Lec. Along the river front near Camden (W), seashore (Li), Anglesea and Cape May Co., generally, common on *Hibiscus*: has been bred from seed pods of *H. grandiflora*, *H. moschatus* and *H. militaris*.

RHYSSEMATUS Chevr.

- R. palmacollis* Say. Hemlock Falls, VII (Bf).
- R. lineaticollis* Say. Caldwell (Cr), Ft. Lee, in seed pods of milk-weed (Bt), Snake Hill (Sf), Newark district (Bf), Madison, VII, 12 (Pr).

CHALCODERMUS Sch.

- C. collaris* Horn. Atlantic City (Castle), Anglesea, V, 31, VI, 28 (W).

ZAGLYPTUS Lec.

- Z. sulcatus* Lec. Staten Island (Lg).
- Z. striatus* Lec. Anglesea (W).

ACALLES Sch.

- A. spec. indet.* Newark (Bf).

TYLODERMA Say.

- T. foveolatum* Say. Throughout the State, V and VI: breeds in stems of *Enothera biennis* (Ch), also in *Epilobium*.
- T. fragariæ* Riley. Arlington, Maplewood, under stones (Jl): breeds in strawberry.

- T. æreum* Say. "New Jersey" (Jl), Newark district (Bf), Westville (Li), Atlantic Co., VI, 20, on cranberry bog.
T. baridium Lec. Lake Hopatcong (Pm).

PHYRDENUS Lec.

- P. undatus* Lec. "New Jersey," in swamps (Jl), lives on *Solanum* (Sz).

PSOMUS Casey.

- P. politus* Casey. Jamesburg, VII, Hemlock Falls (Bf).

CRYPTORHYNCHUS Ill.

- C. parochus* Hbst. Chester (Dkn), Ft. Lee (Sf), Newark district (Bf); lives in butternut (Jl).
C. bisignatus Say. Newark district (Bf), Orange, Clifton, VI, on chestnut and beech, probably lives under bark (Ch), Clifton, V, 30, on chestnut log, VI, 25, on chestnut log and living birch (Bt), Ft. Lee (Sf).
C. pumilus Boh. Hopatcong (Pm), Jamesburg, VII, 4 (Bf), New Jersey (Jl).
C. fuscatus Lec. "New Jersey" (Jl), Orange Mts., Newark, rare (Bf), Hopatcong (Pm), Clementon, XII, 17, sifting old leaves in swamp (W).
C. obliquus Say. "New Jersey" (Jl), Hudson Co. (Ll), g. d., rare (W).
C. obtentus Hbst. Hopatcong (Pm), Ft. Lee (Sf).
C. fallax Lec. Hopatcong (Pm), Ft. Lee (Sf), Orange Mts., Woodside (Bf), Highlands, VI, VII (Ch), Camden, Westville, VII, 20 (W).
C. minutissimus Lec. Hudson Co. (Ll), Atco, Anglesea, V, 30, on dead oak twigs (W).
C. tristis Lec. Hopatcong (Pm), Snake Hill (Sf), Newark, Orange Mts., VI, 7, rare (Bf).
C. ferratus Say. Hopatcong (Pm), Newark, Orange Mts., Woodside, VI, 7 (Bf), Hudson Co. (Ll), seashore (Li), Gloucester, Anglesea, V, 30 (W), VII, 4 (Lv).
C. lapathi Linn. Newark, Hackensack to Orange Mts. (Bf), Bergen (Jl), Snake Hill, Ft. Lee (Sf); an introduced species which is becoming injurious to willows.

BAROPSIS Lec.

- B. cribratus* Lec. "New Jersey," (Coll. Horn). Mr. Schwarz doubts the correctness of either the determination or the locality. The former seems accurate; the latter cannot be verified.

PIAZURUS Sch.

- P. oculatus* Say. Newark district, V, 5, 30 (Bf), Ft. Lee (Sf), Westville (Li), Jamesburg, V, 10.

COPTURODES Casey = COPTURUS.

- C. binotatus* Lec. Hopatcong (Pm), Orange Mts., on dry sumach (Bf), Hudson Co. (Ll), Snake Hill, Ft. Lee (Jl), on honey locust (U).
C. quercus Say. Newark district, common (Bf), Hudson Co. (Ll), g. d., common (W); on oak (U).
C. longulus Lec. Atco, Egg Harbor on oak (W): in galls of *Podapion* (U).

ZYGOMICROS Casey = COPTURUS.

- Z. minutus* Lec. Anglesea on oak, VII, 4 (W), VII, 12 (Sz), Jamesburg, VII, 4, Orange Mts. (Bf).

· ACOPTUS Lec.

- A. suturalis* Lec. Hudson Co. (Ll), Hopatcong (Pm), Ft. Lee (Sf), Palisades, III (Lv), Newark district (Bf), Orange (Jl), Highlands, in dead beech, early in July (Ch).

TACHYGONUS Sch.

- T. lecontei* Gyll. Caldwell (Cr), Atco, Red Bank, on pine, rare (W).
T. spinipes Casey. "New Jersey" (Casey), Landisville (Li).

MONONYCHUS Germ.

- M. vulpeculus* Say. Throughout the State, V, VI and IX, on blue flag, *Ceanothus* and *Verbascum*: breeds in the seed pods of *Iris versicolor* (Ch).

CRAPONIUS Lec.

- C. inæqualis* Say. Anglesea, V, 30 (W), Orange Mts. (Bf), West Hoboken (Jl): feeds in grape; but not injurious in our State.

ACANTHOSCELIS Dietz.

- A. curtus* Gyll. (*Cœliodes*). Anglesea (Li), Orange Mts., in swamps (Bf).
A. acephalus Say. (*Cœliodes*). Spring Lake, Highlands, on *Oenothera biennis* (Ch), common along the coast (W) on evening primrose (Bt), Shrewsbury (Jl).

AULEUTES Dietz.

- A. tenuipes* Lec. Orange Mts. (W).
A. epilobii Payk. = *Cœliodes cruralis* Lec. Orange Mts., in swamps (Bf), Hudson Co. (Ll), "New Jersey" (Jl).
A. nebulosus Lec. Orange Mts., swamps, III, 7, VIII (Bf), Hopatcong (Pm), Gloucester, VII, 16 (W).

ACALLODES Lec.

- A. ventricosus* Lec. Westville, January, sifting (W), Orange Mts., Newark (Bf), Ft. Lee (Sf), Ocean Co., V, 28.

CÆLIODES Sch.

- C. apicalis* Dietz. = *flavicaudis* Boh. Shrewsbury, on white nettle (Jl), also on common nettle, *Urtica dioica* (Ch).

CEUTORHYNCHUS Germ.

- C. affluentus* Dietz = *rapæ*. Fort Lee (Bt), Newark, Orange Mts., VI, 23 (Bf), Hoboken (Jl), South Jersey (W); the "cabbage curculio" feeds on rape, cabbage and allied plants.
- C. sulcipennis* Lec. Hemlock Falls, Orange Mts., V, 30 (Bf), Weehawken (Jl), Hopatcong (Pm), New Brunswick, VII, 20, South Jersey, VII, 15.
- C. decipens* Lec. Orange Mts. (Bf).
- C. pusio* Mann. Hemlock Falls (Bf).
- C. semirufus* Lec. "New Jersey" (Jl).
- C. septentrionis* Gyll. South Jersey (W), Orange Mts. (Bf), Ocean Co. V: on wild mustard, *Sisymbrium officinale*.
- C. puberulus* Lec. Occurs with the preceding, and probably confused with it.
- C. zimmermanni* Gyll. "New Jersey" (Li).

CÆLOGASTER Sch.

- C. zimmermanni* Gyll. South Orange, on beggar's nits (Jl), Newark (Soc).

PERIGASTER Dietz.

- P. cretura* Hbst. (*Cælogaster*). Caldwell (Cr), New Jersey (Jl).

PELENOMUS Thom.

- P. sulcicollis* Fabr. Camden, Gloucester Co. (W), g. d. (Li), Newark, Orange Mts., g. d. (Bf): on *Polygonum* (U).

MECOPELTUS Dietz.

- M. fuliginosus* Dietz. Occurs with and "resembles *Pelonomus sulcicollis*, with which it has been confounded in collections" (Dietz), Newark.
- M. scandens* Dietz. Anglesea, VII, 12 (W).

RHINONCUS Sch.

- R. occidentalis* Dietz = *pericarpus*. Staten Island (Lg), Jamesburg, VII, 11.
- R. pyrrhopus* Boh. Throughout the State, V, 27 to VII, 25: feeds on *Rumex*.
- R. longulus* Lec. South Jersey (W), "New Jersey" (Jl).

BARIS Germ.

- B. umbilicata* Lec. Atco (W), Hudson Co. (Ll), Orange Mts. (Bf), Hopatcong (Pm), Newark, VI, 12, Lahaway, V, 28.
- B. callida* Casey. Orange Mts., Newark district, g. d. (Bf), Anglesea, VII.

B. subænea Lec. Newark district, g. d. (Bf), g. d. (W).

B. transversa Say = *interstitialis* Say. Anglesea, V, 30 (W), occurs on yarrow (Jl).

B. confinis Lec. Ocean Co., V, 28.

B. ærea Boh. Atlantic City (Castle).

B. scolopacea Germ. Anglesea, Westville (W), Hopatcong (Pm).

PLESIOBARIS Casey.

P. t-signum Boh. "New Jersey" (W).

P. albilatus Lec. Buena Vista, on yellow daisies (Li).

GLYPTOBARIS Casey.

G. rugicollis Lec. Atco, rare (W), on *Asclepias* (Jl).

ONYCHOBARIS Lec.

O. pectorosa Lec. Staten Island (Lg).

MADARELLUS Casey.

M. undulatus Say. Throughout the State : on poison ivy (Bf), on grape and *Ampelopsis* (Ch).

AULOBARIS Lec.

A. ibis Lec. Orange Mts. (Bf). I believe I have seen *scolopax* Say, in a local collection, but have no data.

TRICHOBARIS Lec.

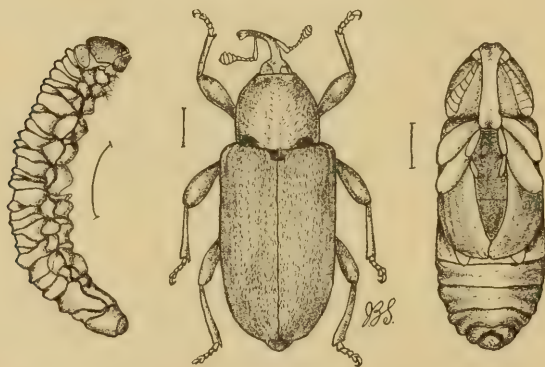


Fig. 158.—Potato stalk borer, *Trichobaris trinotata*: larva pupa and adult, enlarged.

T. trinotata Say. Mercer County, locally common, Freehold, New Brunswick and probably throughout middle and South Jersey. The larva is the "potato stalk borer," and has been at times injurious: its natural food plant is the horse nettle. Remedial measures are cutting and burning the dry potato stalks and killing out horse nettle.

AMPELOGLYPTER Lec.

A. ater Lec. Cape May Court House, V, 26 (W).

PSEUDOBARIS Lec.

P. angusta Lec. Hopatcong (Pm), Snake Hill (Bf).

P. nigrina Say. Hopatcong (Pm), Orange Mts., Newark, Snake Hill, V, 17 (Bf), g. d. (W), on *Solidago* (Jl).

CENTRINUS Sch.

C. picumnus Say. Common throughout the State on flowers, VI to VIII.

C. albotectus Casey. Anglesea, VII (Bf).

C. perscitus Hbst. "New Jersey" (Casey).

C. penicellus Hbst. Atco, VII, 17, Anglesea, VII (W).

C. scutellum-album Say. Common throughout the State in July.

NICENTRUS Casey.

N. lineicollis Boh. "New Jersey" (Jl), Hopatcong (Pm), Newark, Orange Mts. (Bf), Anglesea (W): common on *Ceanothus americanus* (Ch).

LIMNOBARIS Bedel.

L. confusa Boh. Hopatcong (Pm), Orange Mts., rare (Bf).

L. confinis Lec. "New Jersey" (Jl), Montclair (U S Ag).

L. concinna Lec. South Jersey (W).

L. rectirostris Lec. Hopatcong (Pm), Newark, Orange Mts., VII, 7 (Bf), South Orange (Jl).

IDIOSTETHUS Casey.

I. tubulatus Say. Hopatcong (Pm), Orange Mts. (Bf), Fort Lee (Sf).

BARILEPTON Lec.

B. filiforme Lec. Salt meadows, V, 17, 31 (Bf), Masonville, VI, 16 (W).

B. quadricolle Lec. West Hoboken, one specimen (Jl).

PLOCAMUS Lec.

P. hispidulus Lec. Atco, VIII, 14, 21 (W), New Brunswick: breeds in dead twigs of *Robinia* (Ch).

BALANINUS Germ.

B. obtusus Blanch. Hopatcong (Pm), Newark district, g. d. (Bf), New Brunswick. All are nut or acorn weevils.

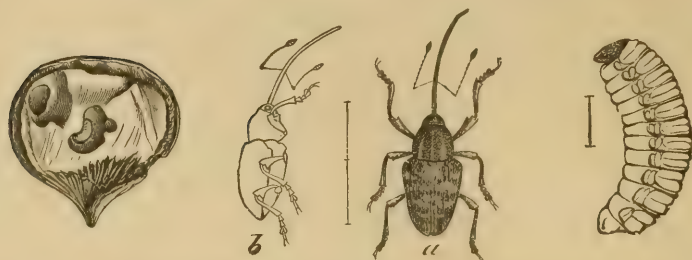


Fig. 159.—Chestnut weevil and its work; *a*, beetle from above; *b*, same in outline from side; larva: all enlarged.

- B. uniformis* Lec. Throughout the State; larva in acorns.
B. nasicus Say. Throughout the State; larva in acorns.
B. caryæ Horn. Throughout the State: larva in hickory nuts.
B. rectus Say. Common everywhere; the larva in chestnuts.
B. quercus Horn. Brigantine, IX (Hn), "New Jersey" (Jl): larva in acorns.
B. caryatrypes Boh. "New Jersey" (Jl), Moorestown (U S Ag): larva in chinquapin (Ch).
B. proboscoideus Fabr. Woodside, Orange Mts., g. d. (Bf): larva in chestnuts.
B. confusor Hamilton. Hopatcong (Pm). Remedies: pick up all nuts as soon as they fall and place them in boxes or barrels, from which the larvæ cannot escape when they come out of the nuts.

Family BRENTHIDÆ.

EUPSALIS Lec.

- E. minuta* Dru Throughout the State, though hardly common: bores under bark of oak, chestnut and maple at Fort Lee (Bt).

Family CALANDRIDÆ.

RHODOBÆNUS Lec.

- R. tredecimpunctata* Ill. Throughout the State, VII, though as a whole not common: breeds in stems of *Xanthium*, *Helianthus* and other weeds (Ch), *Ambrosia*, *Enothera* and thistle (Bt).

SPHENOPHORUS Sch.

S. simplex Lec. "New Jersey" (Jl), (coll Horn).

S. inæqualis Say. "New Jersey" (coll Horn), Anglesea, two specimens (W).

S. ochreus Lec. "New Jersey" (Jl), Orange Mts. (Hess), g. d. (Ll), Snake Hill, one specimen (Joutel); on roots of *Scirpus atrovirens* (U).

S. pertinax Lec. Snake hill, V, 26 (Lv), Newark, Hackensack meadows (Bf), Brigantine beach, IX (Hn), seashore (Li, W), everywhere common, Anglesea, V, 28: Breeds in *Calamus* (Jl).

S. robustus Horn. Hopatcong (Pm).

S. costipennis Horn. Caldwell (Cr), Snake hill, IV, 26 (Lv), Brigantine beach, IX (Hn), seashore (W).

S. cariosus Oliv. Newark district (Bf), Brigantine beach, IX (Hn), Anglesea, V, 30 (W).

S. sculptilis Uhler. Throughout the State, common in the Southern Counties where it is known as the "corn bill-bug." The adult eats into young corn soon after it is up, where this crop is planted on spring plowed timothy sod: larva in the timothy roots. Remedies, fall plow old sod land intended for corn.

S. zeæ Walsh. With the preceding with which it is usually considered identical: I list it separately at Mr Chittenden's suggestion.

S. melanocephalus Fabr. Hudson Co. (Ll), Newark district (Bf), seashore (Li), Lahaway: rare in all cases.

S. sayi Gyll. Anglesea, VII (Sz).

S. placidus Say. Hudson Co. (Ll), Newark, Sea Girt (Bf), Brigantine beach, IX (Hn), seashore (W, Li), Anglesea, VI, 20: common in all cases.

S. parvulus Gyll. Hopatcong (Pm), Snake Hill (Bt), Newark district (Bf), seashore (W), g. d. (Li), Lahaway, V, 28, VII, 3: breeds in blue grass (Ch).

S. retusus Gyll. Newark, West Bergen (Bf), Hopatcong (Pm), Brigantine beach, IX (Hn), seashore, Gloucester, IV, 24, on a sandy field in wagon ruts (W).



Fig. 160.—Bill-bug, *Sphenophorus* sp., from above.

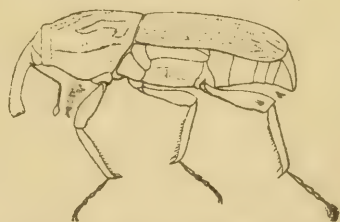


Fig. 161.—Bill-bug, *Sphenophorus* sp. from side.

CALANDRA Clairv.

C. oryza Linn. The rice weevil: is generally distributed, and infests the stored grain.

C. granaria Linn. The granary weevil: also of general distribution and injurious to stored grain. Keep the grain or rice in close bins, use naphthaline as a repellent or bisulphide of carbon to destroy.

DRYOPHTHORUS Sch.

D. corticalis Say. Palisades, IV, 4 (Lv), Arlington (Bf), g. d. (Li), in very old logs (W), under bark of *Pinus rigida* (Ch), Staten Island.

COSSONUS Clairv.

C. platalea Say. Palisades, V, 17 (Lv), Fort Lee (Sf), Newark district, under bark (Bf), g. d. (W), under bark of partly decayed poplar (U).

C. concinnus Boh. "New Jersey" (Jl), Chester (Dkn).

C. corticola Say. Spring Lake, under pine bark (Ch), Newark district (Bf), under bark of dead pines (Bt), g. d. (W), Anglesea.

C. impressifrons Boh. Brigantine beach and mainland, IX (Hn).

MESITES Sch.

M. subcylindricus Horn. Hopatcong (Pm), Orange Mts. (Bf), Cape May, VII (Sz), Anglesea, under bark of washed-up pine logs (W).

PHLEOPHAGUS Sch.

P. minor Horn. "New Jersey" (Jl), Fort Lee (Sf), Anglesea, VII (Sz): breeds in dead wood of various trees (Ch), birch, willow, elm, ash (U).

P. spadix Hbst. Brigantine beach, VI, 23 (W), West Bergen, rare (Bf): an imported species.

AMOURORHINUS Fairm.

A. parvicollis Casey. New Jersey, in dead wood of various trees (Ch).

WOLLASTONIA Horn.

W. quercicola Boh. Landisville (Li), Anglesea, VII, 14 (W), breeds in dead wood of various trees (Ch).

RHYNCHOLUS Germ.

R. brunneus Mann. "New Jersey" (Jl); under bark of *Prunus serotina* (Ch).

R. oregonensis Horn. Anglesea (W).

STENOSCELIS Woll.

S. brevis Boh. Hudson Co. (Ll), Newark district (Bf), Ft. Lee (Sf), Ocean Co., V: breeds in dead wood of most of the deciduous forest trees.

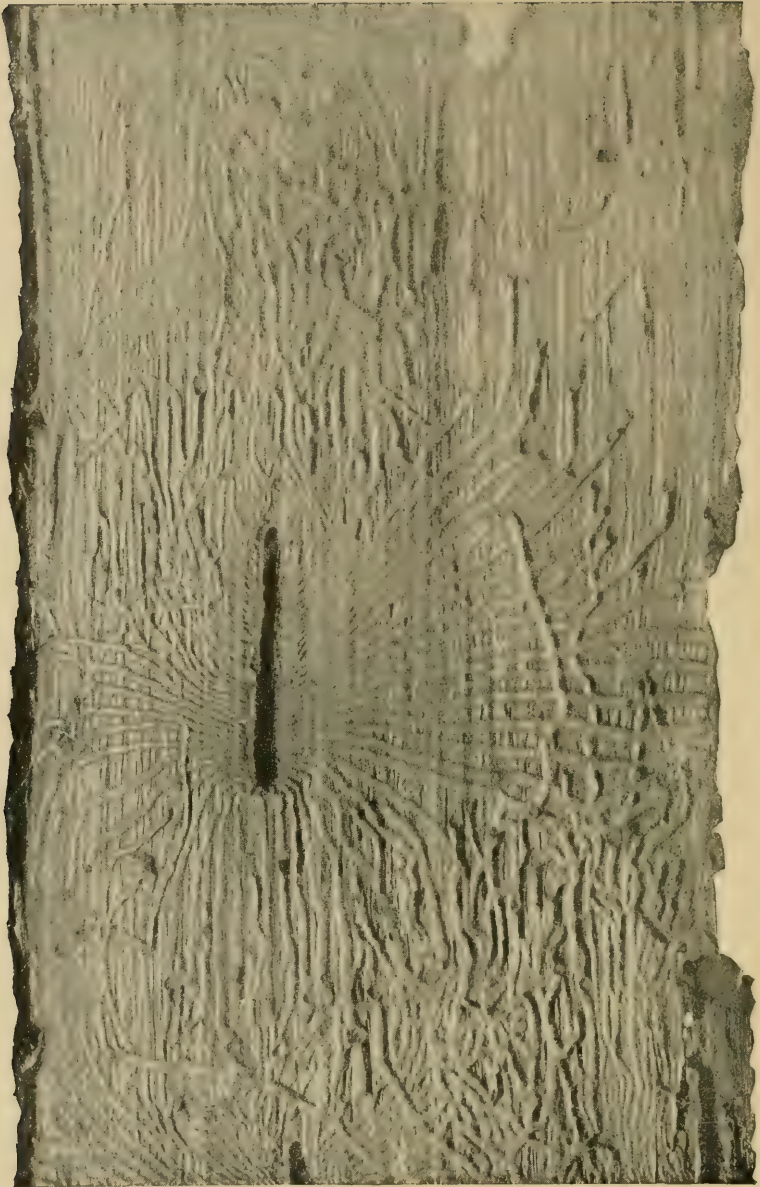


Fig. 162.—Work of the hickory bark beetle *Scolytus h-spinosus*.

Family SCOLYTIDÆ.

These are the "bark-beetles." They are usually cylindrical, or nearly so, often with the end of the elytra truncate and sometimes armed with teeth in the male, the head bent down and retracted, often overshadowed by the prothorax, which may be rugose or otherwise roughened anteriorly, the legs short and capable of being closely folded to the body. They are borers in wood or bark, sometimes making galleries in the heart wood, sometimes remaining in the cambium layer and mining partly in the bark and partly in the wood. In the latter case the parent beetle usually makes a central gallery along the sides of which eggs are laid: the larvæ hatching from these eggs make galleries of their own, increasing in size as they diverge from the center. When full grown they pupate at the end of their galleries and emerge as adults through little round holes. Of this type is the common fruit-bark beetle.

Others that bore in the heart wood differ in habit. Here in many cases the parent beetles make the galleries which serve for the propagation of a peculiar fungus growth termed *Ambrosia*, and upon this the larvæ as well as the adults feed. The habits of some of these beetles are very interesting.

It is perhaps a rule, though there are many exceptions to it, that these insects attack only trees that are not entirely healthy or have been injured locally or generally. The type making galleries in the sap wood conform to this rule quite usually.

To this class belongs the worst pest of this family that we have in New Jersey, the fruit bark beetle, and here we should stimulate and keep our trees in healthy, vigorous growth to avoid injury. A tree that once becomes generally infested by this beetle had better be taken out at once and burnt.

Against species that attack healthy trees we have no remedy; but fortunately these are rare in New Jersey and none of them attack our orchard trees.

Mr. A. D. Hopkins of the West Virginia Experiment Station has kindly assisted in this family and is authority for most of the notes on the food habits.

PLATYPUS Hbst.

P. flavicornis Fabr. Anglesea, V, 21 (W, Sm).

CORTHYLUS Er.

C. punctatissimus Zimm. Eagle Rock (Bf), Staten Island (Lg), bores into sassafras, entering green wood (Hp).

MONARTHURUM Kirsh.

M. fasciatum Say. Found throughout the State, V-VIII: attacks living trunks of hickory, beech, oak, &c. (Ch); enters green sap and heart-wood of dying and dead trees, logs and stumps of pine, oak, hemlock, &c. (Hp).

M. mali Fitch. Orange, VI (Ch), Eagle Rock (Bf), DaCosta (W). rare: habits like the preceding and has an even larger range of food plants, including apple.

PITYOPHTHORUS Eich.

- P. minutissimus* Zimm. Newark district, Orange Mts. (Bf), New Brunswick, common in oak twigs : causes slight if any damage (Hp).
- P. pullus* Zimm. "New Jersey" (Jl), Atco., rare on pine (W).
- P. fagi* Hopk. New Brunswick, boring in oak twigs.
- P. sparsus* Lec. Orange Mts., rare (Bf) : mines in green bark of injured or dying trees, branches, &c., of pine, and hastens death (Hp).
- P. pulicarius* Zimm. Cape May Court House on pine VII (Sz) : breeds in pine twigs (Hp).
- P. puberulus* Lec. Cape May Court House on pine VII (Sz), infests dying twigs, &c., on green trees ; New Brunswick.
- P. querciperda* Sch. Hemlock falls, rare (Bf).
- P. n. sp.* Hopk. Eagle Rock, rare (Bf).
- P. frontalis* Hopk. Eagle Rock, rare (Bf), New Brunswick, in oak twigs.

HYPOTHENEMUS Westw.

- H. aveccæ* Horning,=*eruditus* Westw. Orange Mts., rare (Bf), Anglesea, VII (Sz), New Brunswick, bred from grape and oak : mines in pith and wood of dead twigs and vines (Hp).
- H. crudæ* Panz.=*hispidulus* Lec. Bridgeton (U S Ag), New Brunswick, bred from hickory and oak.
- H. erectus* Lec. New Brunswick, bred from hickory and oak.

STEPHANODERUS Eich.

- S. dissimilis* Zimm. Orange Mts., V, 19 (Bf), Anglesea (W) : bred from grape and oak.
- S. sp. near dissimilis* Hopk. Jamesburg, V, 10.

XYLOTERES Er.

- X. politus* Say. Hopatcong (Pm), Orange Mts., rare (Bf), enters into green wood of dying trees, logs or stumps of oak, beech, pine, &c.
- X. unicolor* Eich. Lakewood (Bradford, det. Linell).
- X. scabricollis* Lec. Jamesburg, V, 10.

XYLEBORUS Eich.

- X. dispar* Fabr. = *pyri* Peck. Orange Mts., rare (Bf), Anglesea (W), Jamesburg, V, cut from birch shoots ; infests also apple, hemlock, beech and oak (Hp).

- X. *obesus* Lec. Hopatcong (Pm), Lakewood (Bradford det Ll): infests black oak, beech and hemlock timber, causing large black pin holes (Hp).
- X. *celsus* Eich. Orange Mts. (Bt), Orange, VI, at light (Ch), DaCosta (W): breeds only in hickory.
- X. *fuscatus* Eich. "New Jersey" (Jl), Orange Mts. (Bf), Ocean Co.; breeds in oak, hickory, chestnut, pine (Hp).
- X. *xylographus* Say. DaCosta, Cape May Court House, V, 26 (W), Anglesea, VII (Sz): breeds in apple and many other deciduous trees.
- X. *pubescens* Zimm. Newark (Bf), DaCosta (W): infests oak, chestnut, cherry, magnolia, &c. (Hp).

DRYOCETES Eich.

- D. *autographus* Ratz. Orange Mts. (Bf): mines under green bark on logs, stumps, &c., of spruce (Hp).
- D. *granicolis* Lec. "New Jersey" (Jl), habits as above (Hp), under bark of chestnut, near roots (Ch).

IPS DeG. = TOMICUS Latr.

- I. *calligraphus* Germ. Throughout the State: mines under green bark of dead or dying pines (Hp).
- I. *cacographus* Lec. As before, with similar habits on pine and spruce.
- I. *pini* Say. "New Jersey" (Jl), Newark (Bf): infests pine and spruce (Hp).
- I. *cælatus* Eich. Throughout the State on pine and spruce.

MICRACIS Lec.

- M. *asperula* Lec. "New Jersey" (Jl).
- M. *opacicollis* Lec. Eagle Rock (Bf), New Brunswick, common in small oak twigs: Mr. Schwarz thinks this is identical with *asperula* for which Hopkins records similar habits.
- M. *suturalis* Lec. Newark (Bf).

THYSANOES Lec.

- T. *quercus* Hopk. Eagle Rock (Bf), infests the bark of dead oak and chestnut twigs (Hp).

SCOLYTUS Geoff.

- S. *quadrispinosus* Say. Throughout the State in July: bores under bark of feeble or dying hickories, and often kills shade trees that would otherwise have recovered under stimulating treatment.

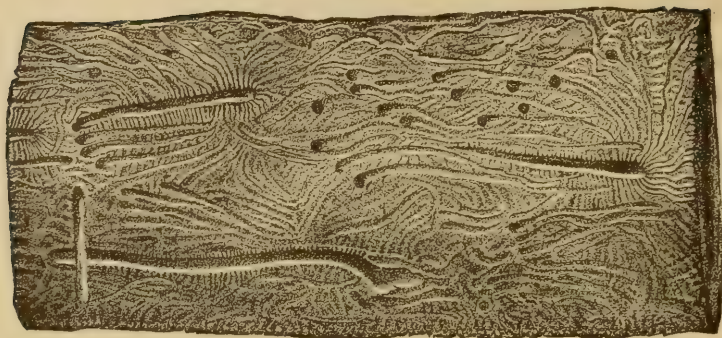


Fig. 163.—Work of the fruit bark-beetle.

S. rugulosus Ratz. The fruit bark-beetle: common throughout the State, the insects often hastening the death of feeble fruit trees of all sorts, and often boring into healthy peach and plum. Remedies; keep trees healthy and vigorous, and cut out at once all in which the beetle has secured a breeding hold.

CHRAMESUS Lec.

C. icoriæ Lec. Throughout the State, V and VI, boring under bark of cut or dying hickory branches.



Fig. 164 —Fruit bark-beetle *Scolytus rugulosus*, enlarged.

PHLÆOTRIBUS Latr.

P. liminaris Harr. Hopatcong (Pm), Orange Mts., V, 19 (Bf): attacks living peach, cherry, &c. (Ch), mines under green bark (Hp).

P. frontalis Oliv. "New Jersey" (Jl): mines under green bark of mulberry (Hp).

CARPHOBORUS Eich.

C. bifurcus Eich. "New Jersey" (Jl), said to infest pine. Mr. Hopkins questions the correctness of the identification.

C. bicristatus Chap. Anglesea (W); a floridian species (Horn).

DENDROCTONUS Er.

D. terebrans Oliv. Throughout the State, locally common: mines in green bark and turpentine on pine.

D. rufipennis Kirby. Lakewood (Bradford, det Ll). Mr. Hopkins declares that other New Jersey specimens in his hands suggests a new species.

HYLESINUS Fabr.

- H. aculeatus* Say. Madison, V, 5 (Pr), Orange Mts., common on cut ash (Bf): mines under the green bark (Hp).
H. opaculus Horn. "New Jersey" (Jl): mines under green bark of elm (Hp).
H. trifolii Linn. Bergen (Jl), the "clover root borer," which probably occurs throughout the State; but has not been reported as injurious.

CNESINUS Lec.

- S. strigicollis* Lec. Orange Mts., g. d. (Bf), Cape May Court House, V, 26 (W).

PHLÆOSINUS Chap.

- P. dentatus* Say. male = *serratus* Lec. female. Orange Mts., common on cedar (Bf), Anglesea, V, 30 (W), VII (Sz), Brigantine, IX (Hn), Newark, V, 9
P. n. sp. Horn. Anglesea (W).

CRYPTURGUS Er.

- C. pusillus* Gyll. = *atomus* Lec. "New Jersey" (Jl): infests pine and spruce, boring in and under bark.

HYLASTES Er.

- H. porculus* Er. = *cavernosus* Zimm. Newark (Bf), g. d. (W): in bark of pine (Hp).

HYLURGOPS Lec.

- H. glabratus* Zett. "New Jersey."
H. pinifex Fitch. "New Jersey" (Jl), Newark: attacks pine, mining in the green bark at base of dying trees. The two species have been referred as identical; but Mr. Hopkins inclines to consider them distinct and both are listed here.



Fig. 165.—Clover-root borer, *Hylesinus trifolii*: *a, a, a*, work of the larva in stems and roots of clover plant; natural size; *b*, larva; *c*, pupa; *d*, adult beetle, enlarged.

Family ANTHRIBIDÆ.

In these insects the mouth parts become more distinct and the labrum is present. The antennæ are not elbowed, but are sometimes very long and with an obvious cylindrical club at the tip. They are usually gray or brown in color mottled with black, and the snout is broad and obtuse.

Very little is known of their habits. The beetles are usually found on dead wood or on tree fungi, but the larva of one of our species is supposed to feed on scale insects.

EURMYCTER Lec.

E. fasciatus Oliv. Orange Mts. (Bf), Orange, Snake Hill (Jl), sea coast (W), always rare : on dry branches (U).

TROPIDERES Sch.

T. bimaculatus Oliv. Newark (Bf).

T. rectus Lec. Sea-coast, rare (W) ; on dead twigs (U).

ALLANDRUS Lec.

A. bifasciatus Lec. New Jersey, on linden (Jl).

HORMISCUS Waterh.

H. saltator Lec. Hopatcong (Pm), Newark (Bf), Gloucester (W), Anglesea, VII (Sz), always rare : breeds in dead wood of deciduous trees (Ch).

H. sp. nov. Schwarz. Anglesea, VII (Sz).

TOXOTROPIS Lec.

T. pusillus Lec. Anglesea (W): a floridian form (Horn).

EUSPHYRUS Lec.

E. walshii Lec. Hopatcong (Pm), Orange Mts., Newark district (Bf), Highlands (Ch), Gloucester (W): breeds in dead wood of deciduous tree (Ch).

PIEZOCORYNUS Sch.

P. mixtus Lec. "New Jersey" (Jl), Anglesea (Li), seashore (W): on old logs and under loose bark (U).

P. moestus Lec. Brigantine beach, IX, rare (Hn).

ANTHRIBUS Geoff.

A. cornutus Say. Jamesburg, VII (Bf), Atco, V, 10, Cape May Court House, V, 26 (W).

CRATOPARIS Sch.

C. lunatus Fabr. Throughout the State, VI, VII, VIII, on tree fungus and dead trees : develops in fungus-attacked logs and tree stumps (Ch).

BRACHYTARSUS Sch.

- B. alternatus* Say. "New Jersey" (Jl), Ft Lee (Sf), Hudson Co. (Ll).
B. tomentosus Say. Hudson Co. (Ll), common all over South Jersey (W);
on rag-weed (U).
B. plumbeus Lec. Highlands (Ch).
B. variegatus Say. Salt meadows (Bf), Spring Lake (Ch), Anglesea, VI, 10
(W), g. d. (W, Li), Ocean Co., V, 28: breeds in smut of corn (Ch).

ANTHRIBULUS Lec.

- A. rotundatus* Lec. Newark, Orange Mts. (Bf), Ft. Lee (Sf), Anglesea, Da
Costa, VIII, 14 (W).

ARÆOCERUS Sch.

- A. fasciculatus* DeG. Undoubtedly brought into the State on dried fruits
and similar stores (Ch).

CHORAGUS Kirby.

- C. sayi* Lec. Orange Mts., Jamesburg (Bf).
C. zimmermani Lec. Fort Lee (Sf).

ORDER LEPIDOPTERA.

This order contains the butterflies and moths, easily recognized by the scaly clothing, which, except in rare cases, covers the body and wings, both pairs of which are used in flight. The head is connected with the thorax by a distinct neck, and the mouth parts are developed into a long tube-like tongue coiled between the palpi when at rest, and used only for sucking up liquid food. In the adult stage the insects are therefore harmless, and, indeed, the butterflies add much to the beauty of the fields and roads by their bright coloring, when flitting from flower to flower in the sunshine.

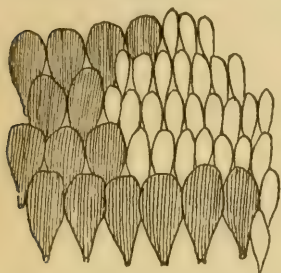


Fig 166.—Wing scales of Lepidoptera.

The larvæ of these handsome creatures are caterpillars, with mouth parts formed for chewing and biting, feeding mainly upon growing vegetation, and therefore distinctly injurious. Whenever they feed openly the arsenites or other stomach poisons are available against them.

In this order the collections are good in the Macro-lepidoptera, and probably few species will be added in most of the families listed; but in the Micro—or small—lepidoptera, much work yet remains to be done.

As the order is listed here it differs totally from the arrangement in the first edition. In no order has the classification been so completely changed, and it has not been easy to connect the two lists: in fact in many cases it has not been even attempted, though usually a portion at least of the terms used in the old list have been cited as synonyms, to afford a clue where most needed. These synonyms, by-the-by, must be strictly taken to refer only to the names as used in this list, and the citation means no more than that the names grouped here under one name were, in whole or in part, found under the name printed in the first edition.

In a general way the arrangement suggested by Dr. Harrison G. Dyar has been followed, but Hampson, Packard and Carpenter have also been compared, the present list agreeing with neither, but forming a compromise in order to retain so far as possible the family and sub-family terms at present in use in the published lists.

Series PAPILIONIDES.

These are the butterflies, or day-flies, characterized by having the antennæ enlarged into a club at the tip, whence they have also been called *Rhopalocera*, or club-horned. They are usually of moderate or large size, brightly colored and marked as a rule, and the wings, when at rest, are held upright or vertically except in the skippers or Hesperidæ, where the fore-wings are vertical and the hind-wings are horizontal.

The series here used represent the larval divisions suggested by Dr. Dyar, and the *Papilionides* have tubercles IV and V remote, in line, or IV higher up than V, the sub-primary setæ absent or much obscured after the first molt.

Family NYMPHALIDÆ.

These are the four-footed butterflies, in which the anterior feet are so much aborted as to be useless for any purpose. The pupæ are suspended by the tail alone.

DANAIS Latr.

D. plexippus Linn. Occurs throughout the State, May to November, sparingly before June and after October; larvæ on milk-weeds—*Asclepias* sp.,—three broods.

AGRAULIS Bd-Lec.

A. vanillæ Linn. Cape May, Seven Mile Beach, Camden County; an occasional visitor only: the larva feeds on *Passiflora*.

EUPTOIETA Doubl.

E. claudia Cram. From Cape May along the coast into Hudson County, west to Elizabeth and sometimes common. VII, 1 to VIII, 30, near Waverly (Br), Staten Island, VII-X (Ds), 3-brooded, VI, VII-VIII, IX (Bt), Mt. Holly (Aaron), Jamesburg, VII, 4 (Sk), Camden, Moorestown (Carney); probably occurs everywhere south of the red shale: larva on violets, mandrake, passion flower, Portulacca, Sedum and Desmodium.

ARGYNNIS Fabr.

A. idalia Dru. Found throughout the State and sometimes locally common. Newark district, VII (Br, Sb), VIII (Wdt), VII, VIII, in swampy meadows (Bt), Staten Island, IX (Ds), Jamesburg, VII, 4 (Sk, Lt): the larva feeds on violets.

The form *ashtaroth*, Fisher, has been taken by Mr. Angelman at Schooley's Mountain.

A. cybele Fabr. Common throughout the State: Newark district, VII (Br), VIII (Wdt), near New York, VI-VIII (Bt), Boonton, VII (Bwl), Staten Island, VI-IX (Ds): larva on violets.

A. aphrodite Fabr. Recorded from points north of the red shale line: Schooley's Mountain (Aaron), Hopatcong, Ft. Lee (Bt), Orange Mountains and Newark district (Soc), Staten Island, VI (Ds), Camden, Moorestown, Westville (Carney): larva on violets.

A. myrina Cram. Common throughout the State: Newark district, VI (Wdt), VII (Br), Staten Island, V-IX (Ds), Jamesburg, VII, 4, Westville, VI, 19, IX, 4 (Sk). Mr. Beutenmuller gives V-IX, and suggests that it is three-brooded: larva on violets.

- A. bellona* Fabr. Throughout the State, more common northwardly: near Newark it occurs with *myrina* (Br), Staten Island, VI-VIII (Ds), near New York, VI-IX (Bt), Cape May, VI, 30, Camden, VI, 18 (Sk): larva on violets.

PHYCIODES Doubl.

- P. nycteis* Dbl. Hew. Recorded from Hopatcong and Greenwood Lake (Bt) to Mount Holly (Aaron), but as common only at Greenwood Lake: all the dates are in June and July. The larva is recorded on Asters, Sun-flowers and *Actinomeris*.
- P. tharos* Dru. Common throughout the State and throughout the season. Mr. Beutenmuller says it is probably three-brooded; the form *marcia* Edw. appears in May and June and produces the form *morpheus* Edw., from which in turn *marcia* again appears: the larva feeds on Asters.
- P. batesii* Reak. The only record is Gloucester (Aaron).

MELITÆA Fabr.

- M. phæton* Dru. Throughout the State in swampy meadows, sometimes not uncommonly: Lake Hopatcong (Pm), Staten Island, V, VI (Ds), larva winters, forms pupa, VI, 25, imago near Newark, VII, 5 (Br), Camden, VI, 10 (Sk). Recorded food plants are *Lonicera ciliata*, *Chelone glabra*, *Viburnum dentatum*, *Mimulus*, *Plantago*, *Gerardia* and others.
- M. harrisii* Scudd. Orange Mountains (Soc), Schooley's Mountain (Aaron); the larva feeds on asters.

GRAPTA Kirby.

- G. interrogations* Fabr. Occurs throughout the State and throughout the season. The adult hibernates and begins to oviposit in May (Br), there are three broods (Bt) and two forms, *fabricii* and *umbrosa*. Food plants are elm, *Cellis*, hop, nettle, basswood and others.
- G. comma* Harr. Also quite generally distributed; but less common and more local; also occurs in two forms, *harrisii* (winter) and *dryas* (summer), and at almost all times during the season. Food plants as before, save that hop is the favorite where it occurs.
- G. faunus* W. H. Edw. Occurs in the northern hilly parts of the State. Schooleys Mountain (Aaron): larva on birch, willow, currant and gooseberry.
- G. progne* Cram. Occurs from New Brunswick northward throughout the State; somewhat local and occasionally common: Camden, one male, IV, 24 (Carney). Mr. Beutenmuller gives two broods, June and August; Mr. Davis finds hibernated specimens, March and April, and fresh examples in midsummer. The larva is recorded from currant and gooseberry.
- G. j-album* Bd. Lec. Occurs locally north of the red shale, IV, V, VIII & X; Staten Island (Ds), Newark (Soc), Caldwell (Cr), Orange Mts., IV (Wdt), Schooleys Mountain (Aaron), Camden, one female (Carney): larva on birch.

VANESSA Fabr.

- V. antiopa* Linn. Common throughout the State, and may be found in almost any month. A specimen of the rare aberration *lintneri* has been taken at Camden, VIII, 4, by Mr. Carney. Hibernates as an adult, and larvæ become prominent in May, July and late August or September, the mid-summer brood sometimes defoliating willows: other food plants are elm, poplar and hackberry: as the larvæ usually feed in colonies they can be easily destroyed when they become troublesome.
- V. milberti* Gdt. Orange Mts. and northward, VI, VII and IX; Camden, XI, 9, rare (Carney), Audubon, X, 24 (R), Staten Island, one spec., others at Schwartswood Lake (Ds), Schooleys Mountain (Aaron). Larva on nettle.

PYRAMEIS Doubl.

- P. atalanta* Linn. Occurs throughout the State, sometimes locally common, usually most abundant in September: hibernates and may be found in almost any month. There are two broods; the larvæ on nettles and hop.
- P. huntera* Fabr. Common, V-X, and on Staten Island, end of November (Ds). Larvæ on nettle, thistle, burdock, sunflower, Gnaphalium and Artemisiæ.
- P. cardui* Linn. Occurs throughout the State, often common locally in September. May be found in any month from May to October, but seems to be two-brooded only. Food plants are thistle, burdock, hollyhock, sunflower, &c.

JUNONIA Doubl.

- J. cœnia* Hbn. More or less generally distributed south of the red shale, and sometimes excessively common in late summer in Cape May and other southern shore counties. It is occasional in the Orange Mountains (Soc), Caldwell (Cr), Fort Lee (Bt), and in Somerset County. It is two-brooded, and may be found from May to November. The larva feeds on plantain, snapdragon and *Gerardia*.

LIMENITIS Fabr.

- L. ursula* Godt. Occurs more or less abundantly throughout the State, and on Staten Island from May to September (Ds). Mr. Beutenmuller gives two broods, May-June, and July-August. The larva hibernates and first chrysalis forms about May 10 (Br). Feeds on apple, plum and cherry among the orchard fruits, also wild cherry, thorn, huckleberry, oak, &c.; but not injurious at any time.
- L. arthemis* Dru. Local in the hilly northern portion of the State: Orange Mts. (Soc), Andover, VIII (Kr), Chester, VIII (Dkn), Schooleys Mountain (Aaron). The larva lives on willow and thorn (*Cratægus*).
- var. *prosperpina* Edw. Is an occasional companion of the preceding.

- L. archippus* Linn. = *disippus* Gdt. More or less common throughout the State, VI-VII; *chrysalis*, V, 15 (Br); Staten Island, X, 9 (Ds); two broods—June, late July and August (Bt). The larva on willow, poplar, apple, plum, thorn, gooseberry, huckleberry, oak, &c.

APATURA Fabr.

- A. clyton* Bd. Lec. Recorded from New York southward and thus within the faunal range of the species; but I have no actual record of captures.

LIBYTHEA Fabr.

- L. bachmanni* Kirtl. Local, but sometimes not uncommon: Lake Hopatcong (Pm), Ft. Lee, Sandy Hook, VIII (Bt), Newark (Soc), Port Richmond, Staten Island, VIII (Ds), Gloucester (Aaron), Avalon, VII, 4 (Kp), Camden, VII, 9 (Carney). The larva feeds on hackberry (*Celtis*).

Family SATYRIDÆ.

These are the wood butterflies, usually gray or blackish, with eye spots above or below, the veins at the base of the wings inflated. The fore-feet are also completely aborted, and the *chrysalis* is suspended by the tail alone. There are no injurious species.

DEBIS Westw.

- D. portlandia* Fabr. Throughout the State, but hardly common. Staten Island, VI-IX (Ds); one brood only (Bt). The larva feeds on grasses.

NEONYMPHA Westw.

- N. canthus* Bdv. Lec. Occurs throughout the State, but not common, VI-IX; Anglesea (Sm), Mount Holly, Jamesburg, VII, 4, Westville, VI, 12 (Sk), Camden, VI, VII (Carney), Newark (Soc), Staten Island (Ds), South River (Sm), Lake Hopatcong (Pm). The larvæ feed on grasses and, according to Mr. Beutenmuller, there is one brood only.
- N. phocion* Fabr. = *areolatus* Sm. Abb. Seven Mile beach, Atlantic City (Aaron), Da Costa, VII, 17, common (Lt), Morristown (Edwards). The larva is said to feed on grasses.
- N. eurytus* Fabr. Occurs throughout the State in and around open woodland and is the most common of our species. It is on the wing from May to August; but, according to Mr. Beutenmuller, is single brooded only, the larva feeding on grasses.
- N. mitchellii* French. Recorded only from Dover, in June (Ju), and from two localities in Michigan. It seems to be rare.
- N. sosybius* Fabr. Occasionally in Southern New Jersey, Mount Holly (Aaron). The larva feeds on grasses.

SATYRUS Westw.

S. alope Fabr. Occurs throughout the State, the typical form less common in the southern Counties. Flies from June to September. What was recorded as *pegala* in the previous edition is certainly an extreme variety of this species in which one spot has become obsolete.

var. *maritima* W. H. Edw. The southern form, most common in Cape May County, at least as common as the type form at Jamesburg and more rare about Newark, Hilton and Bloomfield.

var. *nephele* Kirby. Tends to replace the typical form in the north and common throughout Warren, Morris and Sussex Counties. I have seen a fine series of intergrades ranging from typical *alope* to typical *nephele*, taken near Chester, by Mr. Dickerson. The larvæ are grass feeders.

Family LEMONIIDÆ.

The fore-legs in the male are aborted, in the female complete. They are close to the next family and of no economic importance.

CALEPHELIS Grt. and Rob.

C. borealis Grt. and Rob. Del. Water Gap (Aaron), yet remains the only recorded locality for this State.

Family LYCAENIDÆ.

These are the blues, coppers and hair-streaks, so named from the color of the upper surface or the markings of the under side. They are small in size, with slender bodies and somewhat fragile wings. In the male the tarsi are somewhat aborted, but in the female they are complete. The caterpillars are somewhat slug-like in form, the chrysalis is somewhat constricted centrally and is girthed by a silken thread at the middle as well as fastened by the tail.

THECLA Fabr.

T. halesus Cram. Cape May, Gloucester, Westville (Aaron), Newark (Soc): a southern species of very occasional occurrence. The larva on oaks.

T. m-album Bd. Lec. Atlantic City (Aaron), also a southern species: the larva on oak and *Astragalus*.

T. favonius Sm. Abb. Angelsea, one specimen.

- T. melinus* Hbn. = *humuli* Harr. Occurs locally throughout the State, V-IX; Camden, VI, 17-IX, 17 (Carney), Orange Mts., VIII (Wdt), Cape May, IX (Sk); the larva feeds on hop and bean and is two brooded (Bt).
- T. acadica* W. H. Edw. Greenwood Lake, VI (Bt): the entire State is included in Mr. Scudder's faunal map of the species. The larva on willow.
- T. edwardsii* Saund. Newark (Soc), Jamesburg, VII, 4.
- T. calanus* Hbn. Occurs throughout the State: Newark, V, 1-30, VII, 1-VIII, 5 (Br), VI, 4-10 (Sb), Jamesburg, VII, 4 (Sk), Camden, VIII, 1 (Carney). Single brooded (Bt), the larva on oak, chestnut, hickory and walnut.
- T. liparops* Bd. Lec. = *strigosa* Harr. Newark (Soc), Elizabeth (Bwl), Jamesburg, VII, 4 (Ds). The larva on oak, holly, thorn, plum and apple.
- T. damon* Cram. = *smilacis* Bd. Lec. Quite generally distributed north of the red shale, locally not rare in the Passaic Valley region (Sm); Plainfield, Passaic Valley, Greenwood Lake, Lake Hopatcong, Delaware Water Gap, only where red cedar grows, May and June and again in August (Bt), Hemlock falls, IV, 25 to V, 10 and VII, 15 to VII, 1 (Br), V, 15, VI, 19 (Sb), Staten Island, V (Ds), Morris Plains (Jn), Anglesea (Sk). The recorded food plant is *Smilax rotundifolia*; but Mr. Brehme also gives cedar.
- T. augustus* Kirby. Recorded only south of the red shale. Staten Island, IV, V (Ds), South Amboy (Bt), Gloucester, Westville, IV, 25 (Sk), Mount Holly (Aaron), Clementon, V, 10 (Jn, Lt), Jamesburg, in May.
- T. irus* Godt. Hemlock falls, IV, 18 - V, 10 (Br), Newark (Soc); Orange Mts., IV, V (Wdt), Staten Island, V (Ds), IV and V, in pine woods, Gloucester (Aaron), Westville, V (Sk), Clementon, V, 16 (Jn), Anglesea, V, 1, common (Lt), Jamesburg V. The larva feeds on wild plum and huckleberry.
- T. henrici* Grt. and Rob. South Amboy (Bt), Westville (Aaron), Jamesburg, in May. The larva feeds on plum and cherry.
- T. niphon* Hbn. April and May in pine woods (Bt), Staten Island, V (Ds), Gloucester, Mount Holly (Aaron), Westville, IV, 29, Camden, VI, 18 (Sk), Riverton (Jn), Clementon, V, 9 (Lt), Jamesburg, in May. The larva feeds on pine.
- T. titus* Fabr. Dover, VII, 16 (Jn), Lake Hopatcong (Pm), Newark, VI, 15 - VII, 20 (Br); Staten Island, VII (Ds), Lake Hopatcong, Snake Hill (Bt), Jamesburg, VII, 4 (Sk, Lt). The larva feeds on plum and wild cherry.

FENISECA Grt.

- F. tarquinius* Fabr. Seems generally distributed; but local and nowhere common. The larva is one of our very few predatory caterpillars and feeds on *Schizoneura tessellata*, one of the woolly lice on alder. Mr. Davis finds it on Staten Island in June, and Mr. Beutenmuller states that it is three-brooded.

CHRYSOPTERUS Doubl.

- C. thoe* Bd. Lec. Local and not common in the northern portion of the State : Newark, Secaucus, on salt meadows, VII, 4 (Sb), Caldwell, (Cr), Waverly, IX (Wdt), Schooleys Mountain (Aaron), Staten Island, VII (Ds). Mr. Beutenmuller records two broods—June and July, August and September. The larva feeds on smart-weed (*Polygonum*) and *Rumex*.
- C. epixanthe* Bd. Lec. One specimen, near Newark (Erb), Jamesburg, VII, 4 (Bt, et als), DaCosta (Aaron).
- C. hypophlæus* Bdv. = *americana* D'Urb. Common throughout the State from May to October : the larva feeds on sorrel and clover.

LYCÆNA Fabr.

- L. couperii* Grote. New Jersey is included in Mr. Scudder's faunal map of this species ; but it has not yet been actually taken in the State so far as I am aware. The members of this genus are the "blues."
- L. scudderii* W. H. Edw. Mr. Beutenmuller records it as rare near New York, and it should also occur in New Jersey ; but it has not yet been actually taken. The larva feeds on Lupines.
- L. pseudargiolus* Bdv. Lec. Occurs commonly throughout the State ; but somewhat locally. The forms *lucia* Kirby, *marginata* Edw., and *violacea* Edw., occur in April and May ; the forms *neglecta* Edw., and *pseudargiolus* Bd. Lec., are found throughout the summer and until September. According to Beutenmuller the winter form lays eggs in the flower buds of the dog-wood, *Cornus florida* : the following brood oviposits on the flower stem of black snake-root (*Cimicifuga racemosa*) ; the fall brood on *Actinomeris*. Other recorded food plants are wild bean (*Apios tuberosa*), *Spiræa*, Jersey Tea (*Ceanothus americana*) and *Ilex*.
- L. comyntas* Godt. Common everywhere from May to September. The larva feeds on clover, *Lespedeza*, *Desmodium* and *Phaseolus* ; three broods occur during the season.

Family PIERIDÆ.

These are the "cabbage butterflies" and among them are the most serious of the pests in this series. The butterflies are white or yellow, of good size, more or less black bordered, and with black spots in the disk of the wing. The legs are complete in both sexes, hence they, in common with the succeeding families, are six-footed butterflies. The chrysalis is angular and is girthed as well as fastened at the tail.

The caterpillars are cylindrical, usually green, often velvety in appearance, without spines or other processes. Some feed on cabbage and other cruciferæ, others on clover or leguminous plants generally.



Fig. 172.



Fig. 171.



Fig. 170.

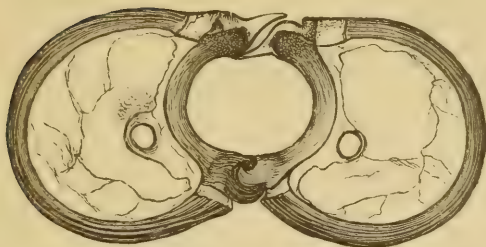


Fig. 167.



Fig. 173.



Fig. 168.



Fig. 169.

Fig. 167.—Section through a butterfly tongue, showing how it is made up and how the two halves are locked.

Fig. 168.—Southern cabbage butterfly, *Pieris protodice*, male.

Fig. 169.—Southern cabbage butterfly, female.

Fig. 170.—Larva and chrysalis of the southern cabbage butterfly.

Fig. 171.—Common cabbage butterfly, *Pieris rapae*, male.

Fig. 172.—Common cabbage butterfly, female.

Fig. 173.—Larva and chrysalis of the cabbage butterfly.

As against the cabbage worm the application of arsenites early in the season is indicated. Or poisoned bran may be sprinkled on the head and this will be attractive to the caterpillars, who eat it in preference to the leaf tissue.

PIERIS Schrank.

P. protodice Bdv. Lake Hopatcong (Pm); south of the red shale line it is sometimes locally abundant: Mr. Beutenmuller records taking about 150 examples in two hours near Camden. I have taken it throughout the season from June to September in Burlington, Gloucester and Salem Counties. The larva is one of the "cabbage worms," and feeds on cruciferæ of all kinds.

Mr. Johnson records the variety *vernalis* Edw., from Riverton, April 16, and Mr. Carney has it from Camden in May.

P. napi Linn.=*oleracea* Bdv. Scarce in the more northern parts of the State: Camden, occasional (Carney).

The larva feeds on cruciferæ of all kinds and is our original native cabbage worm.

P. rapæ Linn. From March to November throughout the State. This is the common cabbage butterfly introduced from Europe and the larva is sometimes very injurious on cabbage, cauliflower and other cruciferous plants: methods of treatment have been already indicated.

var. *immaculata* Skinner and Aaron. Riverton, IV, 16 (Jn).

ANTHOCHARIS Bdv.

A. genutia Fabr. Occurs locally, throughout the State in April and May. Del. Water Gap, Ramapo Mts. (Bt), Little Falls (Ds), Orange Mountains (Erb, Wdt), Hemlock Falls (Br), Westville, Mount Holly, Seven Mile Beach (Aaron), Timber Creek, Riverton (Jn), Burlington Co. The larva feeds on *Arabis* and *Sisymbrium*.

CATOPSILIA Hbn. = CALLIDRYAS.

C. eubule Linn. Cape May county, common, in September, and flies northward, long distances: it is recorded from Chester (Dn), Ft. Lee (Bt), Newark (Soc), Staten Island (Ds), Little Silver, X (Sm), Long Branch (Edwards), Mount Holly, Atlantic City (Aaron), Camden, VIII, 10 (Carney) The larva feeds on *Cassia*.

COLIAS Fabr.

C. cæsonia Stoll. Staten Island, VI, VII, 1896: larva on clover and *Amorpha*.

C. eurytheme Bdv. Mount Holly (Aaron), Camden, scarce (Carney), Long Island (Bt), very occasional: larva on clover and allied plants.

C. philodice Godt. The common sulphur yellow, plentiful throughout the State, IV-XI, and Mr. Davis records a specimen as late as December 6. The larva feeds on pea, clover, Lupines and allied plants, and while quite abundant, has never yet become injurious.

TERIAS Swains.

- T. nicippe* Cram. Throughout the State ; but somewhat local and never very abundant, V, VI, IX and X. Actual captures are recorded at Caldwell (Cr), Carlstadt (Bt), Newark, VIII, 8-X, 12 (Sb), Waverly (Br), Staten Island (Ds), Mount Holly, Westville, Atlantic City (Aaron), Camden (Carney). The larva feeds on clover and *Cassia*.
- T. lisa* Bdv. Lec. Throughout the State in VI, and VIII to X: rather local and not common north of the red-shale ; but the most common species at Anglesea and along the shore in Cape May County in September. The larva feeds on clover and *Cassia*.

Family PAPILIONIDÆ.

These are the swallow-tail butterflies, large in size, the secondaries with a tail-like extension near the hind angle, which gives them their common name. They are usually black with blue and yellow spots, or yellow with black bands. The legs are all complete and fitted for walking, the antennæ being situated close together on the vertex. The larvæ are unique in having a protrusible fleshy process between the thoracic segments which gives off an intensely disagreeable odor. The chrysalids are suspended by a girth at the middle and also fastened at the tail.

PAPILIO Linn.

- P. ajax* Linn. Not rare locally, in some seasons and single specimens have been taken in almost all parts of the State. Newark (Soc), Staten Island, VI and VII, New Foundland, VII (Ds), Hemlock Falls, VII, 1 (Br) ; Mr. Brehme specifically records the variety *marcellus*. The larva on Paw-paw.
- P. philenor* Linn. Throughout the State and sometimes common. Mr. Brehme gives three broods : V, 1-VI, 25, VII, 10-VIII, 1, IX, 5-20. Mr. Davis gives V to IX inclusive on Staten Island and records a specimen November 2. The larva feeds on the Dutchman's pipe, *Aristolochia siphon*, and is sometimes abundant enough to defoliate vines completely.
- P. polyxenes* Fabr. = *asterias* Fabr. Occurs throughout the State, IV to X, and is three brooded. The larva feeds on carrot, parsley, celery and the like, and is sometimes injurious : hand picking is usually the most satisfactory method, though arsenate of lead is effective where it can be safely used. The record of *P. brevicauda*, in the previous list was based on aberrant specimens of the present species.
- P. troilus* Linn. Not rare throughout the State wherever the food plants of the larva occur, IV to IX inclusive : larva on sassafras, spice bush and *Laurus*

P. turnus Linn. Everywhere in the State, V to IX, and sometimes quite commonly. The dimorphic female, *glaucus* is rare. The larva feeds on all the usual orchard fruits save peach, also wild cherry, tulip, ash and others; but is never abundant enough to be injurious.

P. thoas Linn. = *cresphontes* Cram. Single examples occur throughout the State: Caldwell (Cr), Ft. Lee (Bt), Newark (Soc), Staten Island, VIII and IX (Ds), New Brunswick (Sm), Trenton (Aaron). The larva feeds on orange, prickley ash and hop-tree (*Ptelea*).

Family HESPERIDÆ.

These are the "skippers," so called because of their low, jerky flight. They are usually small, stout butterflies, with tawny, black or smoky wings spotted or marked with white or black, the wings comparatively small and thick. The head is broad and the antennæ are widely separated, the club gradual and pointed, usually a little recurved at tip. The legs are all complete. At rest these butterflies have the hind wings horizontal and the forewings vertical, so that at all times the insects are easily recognizable.

The larvæ have large heads, separated by a distinct neck from the rest of the body, and feed mostly on grasses. The pupæ are rounded, not angular, usually partly incased in a slight cocoon, the group thus resembling the moths.

None of them are economically important.

ANCYLOXYPHA Feld.

A. numitor Fabr. Common throughout the State, V to IX, and is three brooded: the larva on grasses.

PAMPHILA Fabr.

P. massasoit Scudd. Camden (Carney), Gloucester, VII and VIII (Aaron), swamps near Westville, VII, 3 - 10 (Sk, Lt), Jamesburg, VII, 4 (Bt, Sk, Sm), Staten Island (Ds). The larva of this and of most other species of this genus feeds on grasses.

var. suffusa Laurent. Westville, VII, 4 - 10 (Lt).

P. zabulon Bd. Lec. Quite generally distributed; but seems to be local and not common. Camden, Merchantville (Carney), Staten Island, VII to X (Ds), Hemlock falls, V, 29, VI, 5 (Sb), Newark, VI (Wdt), Cape May, V, 30 (Sk).

P. hobomok Harr. and *var. pocahontas* Scudd. Quite generally distributed, the form *hobomok* usually the most common. Mr. Davis takes it in May and June on Staten Island. According to Mr. Beutenmuller, *pocahontas* is sometimes common in the mountainous portions of the State in May and June.

- P. sassacus* Harris. Lake Hopatcong (Bt, Pm), Caldwell (Cr), Newark (Soc), Staten Island, Trenton (Ds), Plainfield (Sk), May and June.
- P. metea* Scudd. Schooley's Mountain (Aaron), Hemlock Falls, V, 15 (Sb), Staten Island, VI (Ds), Clementon, V, 10, on sand myrtle, by Philadelphia collectors generally.
- P. attalus* W. H. Edw. = *seminole* Scudd. Clementon, VIII, 3 (Fox), Da Costa, VII, 19 (W).
- P. leonardus* Harr. Quite generally distributed, but not common, VIII, IX. Newark (Soc), Little Falls, Toms River (Bt), Staten Island (Ds), Atco, IX, 6-10 (Nell et als), Camden Co (Carney).
- P. campestris* Bdv. = *huron* Edw. Lake Hopatcong (Pm), Newark (Soc), Mount Holly (Aaron), Cape May, IX, common (Sk), Camden, VIII, IX, common (Carney).
- P. phylæus* Dru. Atlantic City (Aaron), Clifton (Sm), Bayonne, X (Bt).
- P. brettus* Bdv. Lec. Camden, one female, VIII, 10, two males, IX, 7 (Carney).
- P. otho* Sm. Abb. Quite general throughout the State, VI and VII, the form *egeremet* Scudd. sometimes the more common. Lake Hopatcong (Pm), Newark (Wdt), Staten Island (Ds), Gloucester (Aaron), Camden, Merchantville, VII (Carney).
- P. peckius* Kirby. Perhaps the most common species throughout the State. There are two broods, V to VII, and VIII and IX: therefore the insect may be found at almost all times.
- P. mystic* Scudd. Late V and VI and again in VIII and IX, g. d. (Bt), Newark (Soc), Orange Mts., VII, 4 (Lt), Staten Island (Ds), Trenton, Schooley's Mountain (Aaron).
- P. cernes* Bdv. Lec. Common, V-IX, throughout the State: two brooded.
- P. manataaqua* Scudd. Occurs VI and VII, quite generally; but nowhere common: Newark (Soc), Staten Island (Ds), Gloucester (Aaron), Camden, Merchantville, VII, VIII (Carney).
- P. verna* W. H. Edw. Ft. Lee district, VI and VII in meadows, Lake Hopatcong (Bt, Pm), Staten Island (Ds), Orange Mts., V and VII (Wdt).
- P. metacomet* Harr. Quite generally distributed, VI, VII. Lake Hopatcong (Pm), Caldwell (Cr), Newark (Soc, Wdt), Staten Island (Ds), Westville, VII, 10 (Sk), Camden, VIII, 11 (Carney).
- P. accius* Sm, Abb. June and July (Bt), Salem (Aaron).
- P. maculata* W. H. Edw. Camden, VII, 15, one male, one female (Carney).
- P. panoquin* Scudd. Anglesea, VI to IX, very common in the salt meadows, extending north to Atlantic City and south to Cape May Pt.
- P. ocola* W. H. Edw. Salem (Aaron), Camden, IX, 1899, common, never before seen (Carney), Staten Island (Ds).
- P. bimacula* Grt. and Rob. New Jersey is well within the range of this species and a specimen with a New Jersey label was in the Aaron collection at the date of the previous catalogue.

- P. pontiac* W. H. Edw. Snake Hill Hopatcong, VI and VII (Bt), Staten Island, VII (Ds), Westville, VII, 4 (Sk), Gloucester, IX, Jamesburg, VII, 4 (Lt), Camden, Merchantville (Carney).
- P. dion* W. H. Edw. Anglesea, VII, 7, first taken by Mr. Kemp.
- P. vitellius* Fabr. = *delaware* W. H. Edw. Westville, VII, 10 (Lt), rare near New York (Bt), east bank of Delaware Bay, near Maurice River (Aaron).
- P. aaroni* Skinner. Cape May, Anglesea, VI and VIII, common (Lt, et als).
- P. fusca* Grt. and Rob. Camden, VI, 18, Jamesburg, VII, 4 (Sk), Anglesea, VIII and IX (Lt), Orange Mts., IX (Wdt), Staten Island, VI, Sandy Hook (Ds).
- P. hianna* Scudd. Recorded from the vicinity of New York, by Beutenmuller, and New Jersey is well within the range of the species.
- P. viator* W. H. Edw. Lake Hopatcong (Pm), Snake Hill and Newark, VII (Bt), Homestead, VII (Kr), Staten Island), VII, 17-31 (Ds), Cape May (Aaron), Middlesex Co. (Hulst Coll).

AMBLYSIRTES Speyer.

- A. vialis* W. H. Edw. Local, early in the season; Clementon, V, 16 (Jn, Lt), Westville, V (Sk).
- A. samoset* Scudd. New Jersey is well within the range of this species; but no specimens have been actually taken so far as I am aware.

PYRGUS Westw.

- P. tessellata* Scudd. Throughout the State and seasonally common: very abundant near New Brunswick, VIII, 1898 (Sm), Staten Island, IX (Ds), Westville, VIII, 1, IX, 4 (Sk). The larva feeds on mallow, *Althea*, *Abutilon* and *Sidus*.
- P. centaureæ* Ramb. Little Falls (Ds, Bt), V, 7, 14 (Kearfott).

NISONIADES Speyer.

- N. brizo* Bd., Lec. Greenwood Lake, Plainfield, V and VI (Bt), Staten Island, IV to VI (Ds), Newark, V (Soc), Orange Mts., IV (Wdt), Gloucester, Westville, V, 8, Clementon, X, 5 (Sk). More or less common throughout the State: larva on oak and *Cynoglossum* or beggar's lice.
- N. icelus* Lint. Del. Water Gap (Aaron), Fort Lee, Plainfield, V and VI (Bt), Jersey City, VII (Kr), Staten Island, V (Ds): the larva on aspen, willow and witch-hazel.
- N. lucillius* Lint. Greenwood Lake, Orange Mountains, V, VI (Bt). The larva lives on Wild Columbine (*Aquilegia*), *Chenopodium* (Bt), willow and poplar (Dyar).
- N. persius* Scudd. Greenwood Lake and elsewhere in New Jersey, V and VI (Bt), So. Orange and Camden, VII (Bwl), Westville, IV, 9 (Sk). The larva on willow and poplar.

- N. ausonius* Lint. Woodbury, IX, 5 (Sk).
N. martialis Scudd. Sparta, Normannock, VII (Ds), "New Jersey" (Aaron), V-VI and VII-VIII, two broods (Bt). The larva on red-root and wild indigo.
N. juvenalis Fabr. More or less common throughout the State from V to IX. There are two broods, and the larvæ feed on wild beans and other Legumes, as well as on oak.
N. horatius Scudd.
N. terrentius Scudd. Both the last-named occur in this State, according to Mr. Scudder's faunal maps; but I have no actual records.

PHOLISORA Speyer.

- P. catullus* Fabr. Common throughout the State V to IX. It is two-brooded and the larva lives on *Chenopodium* and *Amaranthus*.

EUDAMUS Swains.

- E. pylades* Scudd. Quite generally distributed from the latter part of May to the middle of August: the larva on clover and *Lespedeza*.
E. bathyllus Sm. Abb. Common throughout the State VI and VII, Cape May, V, 30, and IX (Sk): the larva on *Lespedeza*, wild bean and other Legumes.
E. lycidas Sm. Abb. Recorded from all sections VI, VII, and locally as common: larva on *Desmodium* and other Leguminosæ.
E. cellus Bd. Lec. Taken rarely near Newark. The larva on Convolvulaceæ.
E. tityrus Fabr. Throughout the State V to IX, not rarely: the larva on locust and other Legumes.
E. proteus Linn. Occasional near Newark (Soc) and Cape May (Aaron). The larva on wild bean, *Phaseolus*, and other Legumes.
-

Series SPHINGIDES.

These are the "hawk moths" often seen flitting about flowers during the day and mistaken for humming birds; but more often in the early evening, hovering over deep flowers like *Petunia* or evening primrose, and extending the long tongue to reach into the nectar. They are of moderate or large size, very stout, abdomen long, conic, rarely with a fan-like tuft at the tip. The antennæ are fusiform and prismatic, with a short, re-curved tip, wings stout, narrow and pointed.

The larvæ are as characteristic as the adults, and most of them are furnished with a curved horn on the dorsal surface of the tail segment, or in place of it a polished eye-like spot. They look formidable, but are actually harmless, and from their habit of sometimes resting with head and anterior segments elevated they get their "sphinx" appellation.

In some species the tongue is nearly six inches in length when fully uncoiled, but in some others it disappears completely. A few of the species are of some economic importance.

According to Dr. Dyar, the larvæ in this series have "tubercles IV and V remote, V higher than IV, obscured after first molt. An unpaired process bearing tubercles on the eighth abdominal segment."

Family SPHINGIDÆ.

Sub-family MACROGLOSSINÆ.

These are the Humming bird Hawk-moths in which the wings are partly transparent and the abdomen has fan like tuftings at tips. They fly in the sunshine and favor lilacs.

HEMARIS Dalm.

H. tenuis Grt. Quite generally distributed, though not common: the larva on *Symphoricarpus*.

H. diffinis Bdv. Not common; but quite generally distributed: Del. Water Gap, VII, 8 (Jn): larva on *Apocynum* and *Symphoricarpus*.

H. axillaris Grt. and Rob. Morris Plains (Neum), Suffern, V (Bt).

H. gracilis Grt. and Rob. Lakewood (Bt), Hopatcong (Pm).

H. thysbe Fabr. var. *floridensis* Grt. and Rob. var. *uniformis* Grt. and Rob. The most common and universally distributed species of the genus, occurring from May to August. The variety *floridensis* is recorded from Morris Plains (Neum) and Clementon (Lt): *uniformis* is from Staten Island and New Jersey generally: the type form occurs everywhere. There are two broods and the larvæ feed on sheepberry, *Viburnum*, honeysuckle and snowberry. Mr. Beutenmuller adds that he has never raised the form *thysbe* from *uniformis* larvæ.

Sub-family CHEROCAMPINÆ.

AELLOPOS Hbn.

A. tantalus Linn. A southern species which sometimes occurs along the coast.

ENYO Hbn.

E. lugubris Linn. Also a visitor from the south: has been taken at electric lights at Long Branch and Asbury Park.

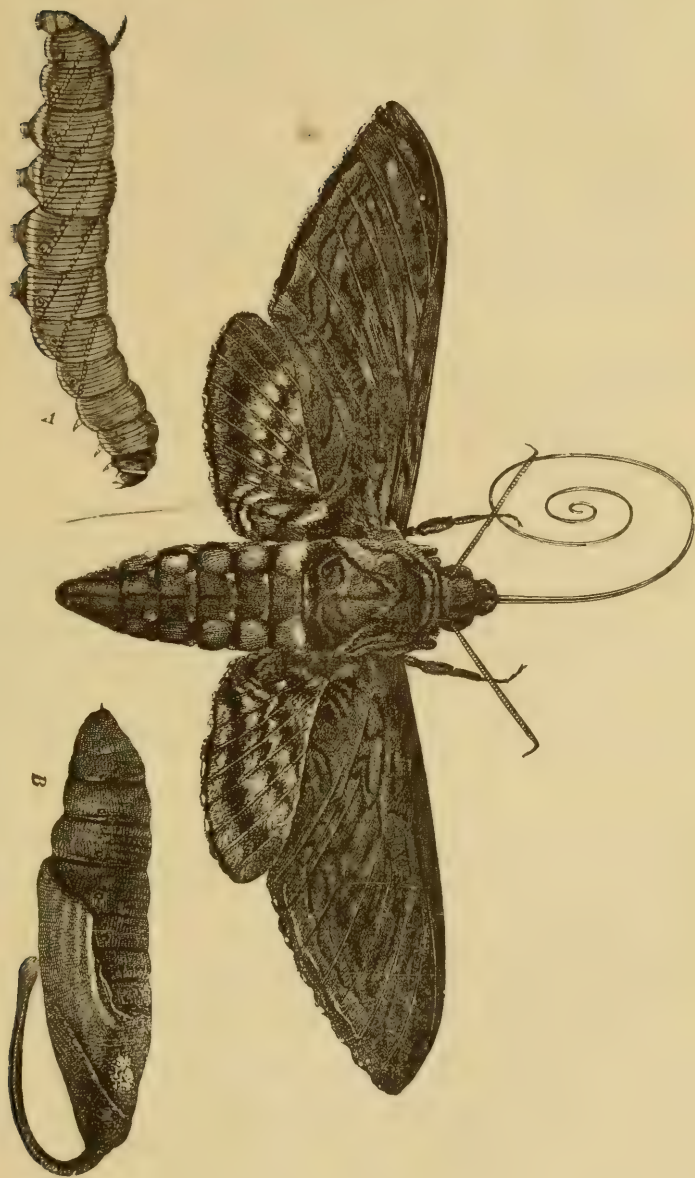


Fig. 174.—The potato hawk-moth *Protoparce celensis*, larva, pupa and adult.

AMPHION Hbn.

- A. *nessus* Cram. Locally common; Newark, V and VI, Little Falls, VI, 12, 23 (Sb), Staten Island, VI (Ds), Anglesea, V, 30, quite plentiful on flowers of the blue flag (Lt). The larva on grape, Virginia creeper, Fuchsia and *Epilobium coloratum*.

THYREUS Swains.

- T. *abbottii* Swains. Not uncommon locally, V-VII, wherever the food plants grow: Staten Island (Ds), Jersey City (Kr), Newark (Soc), Caldwell (Cr). The ugly larva on grape and Virginia creeper is familiar and Mr. Brehme gives "eggs from May 5, larvæ to July 5."

DEIDAMIA Clem.

- D. *inscripta* Harr. Generally distributed; but rarely obtrusive. Larvæ are sometimes found in considerable numbers near Jersey City (Kr) on grape, and it is not infrequently bred by collectors from Virginia creeper.

DEILEPHILA Ochs.

- D. *galii* var. *chamænerii* Harr. Local in the northern half of the State: Newark (Soc), Hudson County, VIII (Kr), Caldwell (Cr). The larva on grape and *Epilobium*.
- D. *lineata* Fabr. Common throughout the State, VII-IX, and especially fond of the newly-opened flowers of the evening Primrose (*Oenothera*). The larva is most common on Purslane, but also eats apple, plum, grape, currant, gooseberry, buckwheat, turnip, watermelon, chickweed, evening primrose and a variety of other plants. It has never yet been injurious.

CHÆROCAMPA Dup.

- C. *tersa* Linn. Locally common, but not g. d. Hudson County, VIII, on Phlox (Kr), Newark, V, VII, VIII and IX (Sb), VI (Br), Caldwell (Cr), Staten Island, VIII and IX (Ds). The larva on *Bouvardia* and buttonweed (*Spermocoe glabra*).

ARGEUS Hbn.

- A. *labruscæ* Linn. An occasional visitor from the South.

PHILAMPELUS Harr.

- P. *linnei* Grt. & Rob. Occasional along the coast.
- P. *vitis* Linn. Occasional along the coast: has been taken by Newark collectors.
- P. *pandorus* Hbn. Occurs throughout the State, June to August. The larva feeds on grape and Ampelopsis. "Eggs in June and July, larva feeds until September" (Br).

P. achemon Dru. With the preceding and on the same food plants: not rarely attracted to light. The larvæ are easily recognizable by the absence of the horn and by the retractile anterior segments, a character also found in the next genus.

AMPELOPHAGA Brem. & Gray.

A. chœrilus Cram. Common throughout the State, V to VIII. According to Brehme eggs are found V and VIII and the larvæ feed from 20 to 30 days. The usual food plants are grape and Virginia creeper; but they also live on sour gum, Azalea, Viburnum, sheepberry, &c.

A. myron Cram. Common throughout the State, VI-VIII, and is sometimes attracted to light. Eggs are found, V, VII, VIII (Br). The larva feeds on grape and Ampelopsis.

A. versicolor Harr. G. d., but very local and rarely in numbers, V-VII. There are two broods and the larva feeds on button-ball (*Cephalanthus occidentalis*) and *Nesœa verticillata*.

Sub-family SPHINGINÆ.

DILOPHONOTA Burm.

D. ello Linn. A visitor from the South, occasionally in some numbers, taken by the Newark collectors. The larva in Florida feeds on *Euphorbia* (Dyar).

The record of *D. obscura* has proved unreliable and the species is therefore omitted.

PROTOPARCE Burm.

P. celeus Hbn. Throughout the State, VI-IX, though rarely common. Larva on potato and similar plants; occasionally injurious. Remedies are hand picking or Paris green in the earlier stages.

P. carolina Linn. Throughout the State, VI-IX. The larva is the "tomato worm" of Southern New Jersey, and does considerable injury each year: it is less common northwardly and occurs also on potato and other plants of the same natural family. Remedial measures as before.

P. rustica Fabr. I took a single specimen near Union Hill years ago, and have no other records of its capture. The State is well within the faunal range of the species and it should occur where the food of the larva *Chionanthus* and *Jasminum*, occurs.

P. cingulata Fabr. Generally distributed; but nowhere abundant. The larva feeds on morning glory, sweet potato and other *Ipomœa* and *Convolvulus* species until late in fall. Mr. Brehme records finding a full-grown example on morning glory, October 10.

SPHINX Linn.

S. kalmiæ Sm. and Abb. Lyons Farms, VI (Br), Newark, V, 12, VI, 2, 8, VII, 6 (Sb), Staten Island, VIII (Ds), g. d. Mr. Brehme finds larvæ in VI-VIII on ash: other food plants are lilac, laurel and *Chionanthus*.

- S. drupiferarum* Sm. and Abb. Lake Hopatcong (Pm), Newark, V and VI (Soc), VII and VIII, larva on wild cherry, VIII, 9, adult, VI, 9 (Sb), Caldwell (Cr), Staten Island, VI (Ds), g. d. Mr. Brehme records eggs V and VI, larvæ until August on wild cherry. Other food plants are apple, plum and lilac, the caterpillar being sometimes abundant enough to be noticed on plum.
- S. gordius* Cram. G. d., sometimes not rare: Hopatcong (Pm), Newark, V and VI (Soc), Caldwell (Cr). Mr. Brehme reports eggs V to VII, and larvæ until frost on huckleberry, bayberry and birch, near Waverly. Other recorded food plants are ash, apple, privet, &c.
- S. luscitosa* Clem. Local and not common: Mr. Brehme finds eggs on willow, near Newark, V, 16 to VII, 1; adults, V, 27, VI, 1, 4, 20 (Sb).
- S. chersis* Hbn. G. d.; but somewhat local and nowhere common, VI, VII; Newark (Soc), Staten Island (Ds), Hudson Co. (Kr): larva on lilac and ash.
- S. eremitus* Hbn. G. d. and occasionally quite plentiful: the larva in August on pepper and mountain mint near Newark (Br), also on wild bergamot and *Salvia*.
- S. plebeius* Fabr. Newark, VI, 10 (Sb), Caldwell (Cr), Hoboken VIII (Kr), Staten Island, VI and VII (Ds), g. d. The larva feeds on the trumpet vine (*Tecoma radicans*), *Bignonia* and *Passiflora*.

DOLBA Walk.

- D. hylæus* Dru. G. d.; but local. Newark, VI (Soc), Caldwell (Cr). Eggs VI and VII; larvæ feed very fast and become full grown in twenty days on black alder, *Ilex verticillata* (Br): other food plants are *Prinos* and sweet fern.

CHLÆNOGRAMMA Smith.

- C. jasminearum* Bdv. Lake Hopatcong (Pm), Caldwell (Cr), Newark (Soc); always rare and local: the larva on ash and lilac.

CERATOMIA Harr.

- C. amyntor* Hbn. Throughout the State VI and VII. Mr. Brehme reports eggs VI and VII, larvæ until October, on elm, linden and birch. The caterpillars are easily recognizable by having four little thoracic processes in addition to the usual anal horn.
- C. undulosa* Wlk. G. d., and usually not rare: Caldwell (Cr), Newark, V and VI (Br), VIII, 18, 20 (Sb), Staten Island, VI and VII (Ds), Lake Hopatcong (Pm), pupæ common at Gloucester (Lt). Mr. Brehme records eggs VI and VII, larvæ until August, common all over Essex, Hudson and Union Counties: food plants are lilac, privet, ash and Locust.

ELLEMA Clem.

- E. harrisii* Clem. Rare, but g. d. The larva on Pine.
- E. coniferarum* Sm. and Abb. Equally rare and also a pine feeder: Newark (Soc).

Sub-family SMERINTHINÆ.

In this sub-family the tongue is short or entirely absent, the head small, abdomen more plump, the wings angulated, dentate or scalloped.

TRIPTOGON Brem.

T. modesta Harr. Quite generally distributed; but rare. Newark, VI, 27 (Sb), Rutherford (Bt), Little Falls (Ds). Larva on poplar and willow.

SMERINTHUS Latr.

S. geminatus Say. Hopatcong (Pm), Caldwell (Cr), Newark, V, VI, VII (Br), VIII, 13 (Sb), Staten Island, VI, VII and VIII (Ds), g. d. Mr. Brehme finds eggs V and VI, and larvæ until August on willow and poplar: other food plants are elm, apple, cherry, plum and ash.

PAONIAS Hbn.

P. excæcatus Sm. & Abb. Occurs throughout the State, quite commonly, June to September. Mr. Brehme finds eggs VII and VIII, larvæ, which grow very slowly, until October. Food plants include the Rosaceæ generally and a large number of shade and forest trees.

P. myops Sm. and Abb. Apparently local, and my records are only from Hopatcong (Pm), Newark, VII, 4, 11, and Caldwell (Cr). Larvæ may be found until November (Br), on wild and cultivated cherry.

P. astylus Dru. Rare and recorded from few localities Hopatcong (Pm), Newark, V, 22, VI, 23, VII, 3 (Sb), Fort Lee (Dyar). Mr. Brehme finds eggs, VI, VII and VIII; larvæ from July first until frost, rarely but not locally, on huckleberry and dangleberry.

CRESSONIA Grt. and Rob.

C. juglandis Sm. and Abb. G. d. and sometimes rather common: Newark, V (Br), VI, 2 (Sb), Staten Island, VI (Ds), Caldwell (Cr), Fort Lee, Hopatcong (Bt). Mr. Brehme finds eggs V to VIII, larvæ until October, on hickory and walnut: other recorded food plants are ironwood and wild cherry. The larva is known as the "squeaking sphinx" (Dyar).

Series SATURNIIDES.

These are all large moths, and among them our American silk spinners. Dr. Dyar finds in these larvæ that tubercles IV and V are united, all the setæ borne on prolonged tubercles subject to various modifications. Usually an unpaired dorsal tubercle on the eighth or ninth abdominal segment.

Three families are represented. The *Saturniidæ* are the largest of the species, expanding up to six inches or more, the wings broad and usually with clear or transparent discal spots. The mouth parts are aborted and the antennæ in the male have two branches or pectinations on each side of each joint. The larvæ are all silk spinners.

The *Hemileucidæ* are represented by only one species, black with a partly transparent central band, the antennæ with single pectinations on each side, the joints very short and numerous.

The *Ceralocampidæ* are quite different in appearance, the wings narrower, pointed at the apex, the antennæ with two branches to each side of each joint, but pectinated on the basal half only. The larvæ are furnished with horns or other processes, often becoming very large and formidable in appearance. None of them are silk spinners and the pupæ are formed under ground.

Several of the larvæ in this series feed on cultivated plants and orchard tree, but none are ever really troublesome. Their large size render them easily visible and hand-picking is the best remedy. The species of *Anisota* sometimes strip forest trees over quite an area; but have done no permanent injury in New Jersey so far as my observations have extended.

Family SATURNIIDÆ

ATTACUS Linn.

- A. *promethea* Dru. Common all over the State, VI to VIII. The larva feeds chiefly on sassafras; but also on a large variety of fruit and shade trees: it is never injurious.
- A. *angulifera* Wlk. G. d., VI to VII; but rare: the larva on the tulip-tree, sassafras and wild cherry.
- A. *cecropia* Linn. G. d., rather common, VI to VIII. The larva feeds on most orchard and shade trees, and occasionally devours considerable foliage on grape and small fruits.

SAMIA Hbn.

- S. *cynthia* Dru. Common near Jersey City and for some distance from it in every direction. Also found near Trenton and Philadelphia. Does not occur at New Brunswick, nor have I found it in other parts of the State. Mr Davis records it in Staten Island from June to August. The species is an introduction from China, and feeds chiefly, though not exclusively, on the Ailanthus or "tallow-tree."

ACTIAS Leach.

- A. *luna* Linn. G. d.; not rare, VI to IX; two-brooded. The larva feeds on walnut, sweet gum, birch and other forest trees.

TELEA Hbn.

T. polyphemus Cram. Common throughout the State, VI to VIII : the larva on most forest and shade trees.

HYPERCHIRIA Hbn.

H. io Fabr. Common all over the State, VI to VIII ; the larva on Rosacæ of all kinds and on a large list of other food plants. It is sometimes a little injurious to corn.

Family HEMILEUCIDÆ.**HEMILEUCA** Wlk.

H. maia Dru. Greenwood Lake (Bt), Gloucester (Lt), Asbury Park, Culvers Pond ; the larva on oak in July ; moths in September and October.

Family CERATOCAMPIDÆ.**EACLES** Hbn.

E. imperialis Drury. Throughout the State, VI to VIII, sometimes not uncommonly. The larva feeds on a large variety of forest trees including many conifers.

CITHERONIA Hbn.

C. regalis Fabr. G. d. VI, VII. The formidable looking larva which has been called the "hickory horned devil" feeds on hickory, walnut, butternut, ash, persimmon, sweet gum and other trees.

SPHINGICAMPA Walsh.

S. bicolor Har. Lake Hopatcong (Pm) : a single specimen on the beach near Sandy Hook some years ago. The larva feeds on *Gleditschia*.

ANISOTA Hbn.

A. stigma Fabr. Rather common, VII, and often coming to light. The larva on oak, hazel and chestnut.

A. senatoria Sm. and Abb. Occurs VI-VIII, throughout the State. The larva is the common "oak-worm" which is sometimes locally abundant and destructive. I have seen acres of oak near Jamesburg almost completely defoliated by it.

A. virginiensis Dru. G. d., but more rare than the other two. Flies in June, and the larva also feeds on oak.

DRYOCAMPA Harr.

D. rubicunda Fabr. G. d., V, VI, VII, but local. The caterpillars are sometimes injurious to soft maple and more rarely feed on oak.



Fig 175.—The rosy *Dryocampa*, *D. rubicunda*; a, larva; b, pupa; c, female adult.

Series BOMBYCIDES.

This series contains a large number of very diverse families, in all of which the larvæ have the sub-primary setæ present, represented in the functional armature even when most modified, tubercle VII converted into a leg plate; IV and V, usually separate, IV moved up behind the spiracle; I and II separate (except in *Nola*). Crotchets of abdominal feet rarely forming a circle.

There is scarcely a common, easily recognizable superficial character that can be given for this series at large, and the families are best mentioned separately.

Family LASIOCAMPIDÆ.

Stoutly built, rather shaggy moths of medium size, with pectinated antennæ, small, retracted head, slender palpi and short tongue. The wings are rather short and broad, very densely clothed, usually with a pair of pale or darker brown median lines. The larvæ are lappet- and tent-caterpillars, some of them being of economic importance.

The lappet-caterpillars are so called because they are much flattened and have along the sides fringed processes which, when at rest, are so closely applied to the surface upon which they lie that the insect becomes practically

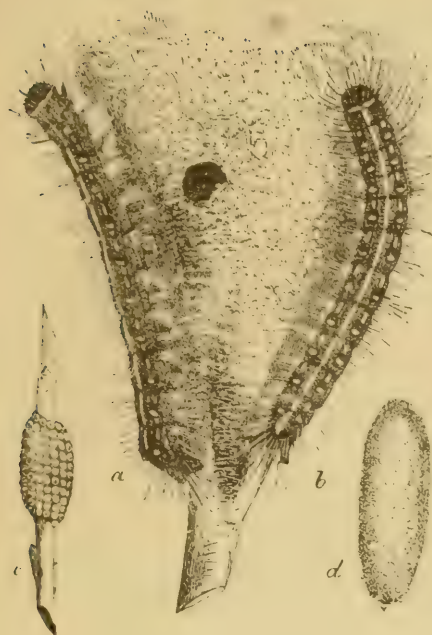


Fig. 178.



Fig. 179.



Fig. 180.



Fig. 176.

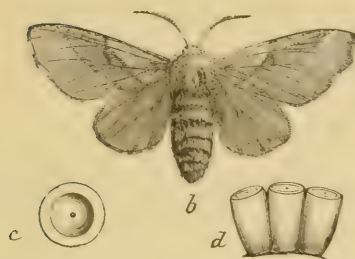


Fig. 177.



Fig. 183.



Fig. 181.



Fig. 182.

See explanation at bottom of page 394.

invisible. None of these are plentiful enough to do harm. The tent-caterpillars live in great colonies, which make a web or tent in a crotch and feed from that point. They sometimes defoliate large trees or even entire orchards.

Tents should always be torn out and the larvæ destroyed whenever noticed and within reach. Spraying with the arsenites on the foliage surrounding the nest will kill the larvæ when young. The egg belts can be gathered and destroyed in winter.

PHYLLODESMA Hbn.=GASTROPACHA Ochs.

P. americana Harr. Seems to occur throughout the State ; but rarely. The larva feeds on apple, cherry, maple, birch, poplar and other trees : adults in May and July.

CLISIOCAMPA Curtis.

C. disstria Hbn. The "forest tent caterpillar;" occurs throughout the State, rarely in orchards, more commonly on forest trees. The moths come in June and July. This species has done great injury in northern New York in 1899, but has never caused trouble in New Jersey.

C. americana Fabr. The common "Tent caterpillar" of the orchard : especially abundant on apple and wild cherry, the young caterpillars hatching almost before the leaves are out and forming the tent in a crotch. Occurs throughout the State in late June and early July.

ARTACE Wlk.

A. punctistriga Wlk. Elizabeth, X, 8 (Kp), rare near Newark, Freehold (U S Ag) : the larva on oak.

TOLYPE Hbn.

T. velleda Stoll. The "lappet moth." Have seen larvæ from almost all parts of the State ; but always singly : it feeds on cherry, apple, pear, maple, oak, elm, lilac, etc. The moth flies in September. Caldwell (Cr), Newark (Sb).

T. laricis Fitch. Newark at light (Ang), rare near N. Y. (Bt). The larva feeds on pine, larch and hemlock and the insect should be distributed throughout South Jersey.

Fig. 176.—Forest tent caterpillar, *Clisiocampa disstria*.

Fig. 177.—*Clisiocampa disstria* : *b*, female moth ; *c*, single egg from above ; *d*, eggs from side ; *e* and *d'* enlarged.

Fig. 178.—Orchard Tent-caterpillar : showing larva, base of tent, cocoon and egg mass.

Fig. 179.—*Clisiocampa americana*, female.

Fig. 180.—White marked Tussock moth, *Orgyia leucostigma*, male.

Fig. 181.—Larva of white marked Tussock moth.

Fig. 182.—White-marked Tussock moth ; *a*, female on its egg mass ; *b*, young caterpillar suspended on thread.

Fig. 183.—White marked Tussock moth, pupæ ; *b*, male ; *c*, female.

Family LIPARIDÆ.

These are the "tussock moths," sombre gray species of moderate size, with broad wings, broadly pectinated male antennæ, and long hairy fore-legs, which when at rest are stretched out forward. In the genus *Notolophus*, to which our only injurious species belongs, the female is wingless. The caterpillars are brightly colored and have truncated dorsal tufts or brushes of hair, and long pencils at or near the extremities.

The "white marked tussock moth" is double brooded, the wingless female laying the eggs in a mass on the cocoon from which she has just emerged. The eggs are held together by a snow-white frothy mass which hardens and becomes brittle, and thus the winter is passed. Gathering these egg masses from the trees in winter will save injury the following summer. The feeding larvæ succumb readily to paris green or other arsenites in their early stages. The second brood, occurring in midsummer, may also be reached by gathering and destroying the cocoons which are formed on trees, fences or any other convenient projection.

NOTOLOPHUS Germ. = ORGYIA Ochs.

N. definita Pack. Fort Lee (Bt), Lake Hopatcong (Pm). Probably occurs throughout the northern part of the State. The larva is quite a general feeder.

N. leucostigma S. and A. The "Vaporer" or "White-marked Tussock Moth." The caterpillar is the most common of the city shade tree pests, and is abundant in proportion to the size of the city and the number of sparrows. It occurs rarely in small towns or villages or where the sparrows are not dominant.

OLENE Hbn. = PARORGYIA Pack.

O. cinnamomea G. and R. = *parallela* G. and R. Jersey City (Sm), Fort Lee, Greenwood Lake (Bt), Newark (Soc), Hopatcong (Pm). Larva on oak, apple, plum, walnut, horse chestnut, &c.

O. achatina A. and S. Near Newark in July: larva on the the usual orchard trees; also oak, hickory, chestnut, &c.

O. leucophæa A. and S. = *clintonii* G. and R. Newark (Soc), Morris Plains (Bt), Greenwood Lake (Dyar), Hopatcong (Pm). Larva on persimmon, oak, hickory.

Family SYNTOMIDÆ.

Rather slightly built, small or moderate sized moths, black and yellow in color, with functional mouth parts, pectinated male antennæ and rather long,

slender abdomen. The venation of the hind wings affords the best structural characters for recognizing the members of this family, none of which are at all injurious.

LYCOMORPHA Harr.

L. pholus Dru. Hopatcong (Pm), Staten Island, IX (Ds), the larva on lichens (Bt), growing on stone fences (Dyar); common locally on golden rod in September.

SCEPSIS Wlk.

S. fulvicollis Hbn. Camden Co., IX (Lt), Staten Island, VI, VIII and IX (Ds), Orange Mts., VIII, IX (Wdt), Newark, VII (Bwl), quite generally distributed, rather common in swampy meadows, VI to IX (Bt), larva on grass.

CTENUCHA Kirby.

C. virginica Charp. Found on Spiræa and other flowers July to September; more commonly in the northern portion of the State: larva on grass.

Family LITHOSIIDÆ.

Small slender moths, with narrow primary and broad secondary or hind wings. The antennæ and palpi are slender, and the mouth parts are functional. They differ from the *arctids* in lacking ocelli or simple eyes. The larvæ are covered with tufts of short, stiff hair, feed mostly on lichens and are not injurious.

CRAMBIDIA Pack.

C. pallida Pack. Rare near N. Y., VIII (Bt), Anglesea at light, IX, 3 (Lt), VIII, 20 (Kp), New Brunswick, IX, 16, 18.

HYPOPREEPIA Hbn.

H. miniata Kirby. Andover, VIII (Kr), Newark (Wdt), Hopatcong (Pm), Anglesea, V, 28, and later until August.

H. fucosa Hbn. Occurs throughout the State in July and August. Have beaten it from pines, stirred it up in mossy meadows and taken it at light. Larva on mosses and lichens growing on trees (Bt). This is the smaller species, with the ground color partly yellow.

CISTHENE Wlk.

C. subjecta Wlk. Anglesea, VIII, 21 (Lt), VII, 15 (Sm). The larva feed on lichens (Bt).

Family ARCTIIDÆ.

The adults are known as "tiger moths" from their bright stripings, the larvæ as "woolly bears" from the dense clothing of hair with which they are covered. The moths are stoutly built, of moderate or small size, with a broad head, rather small palpi and a functional tongue. The antennæ vary, but are often pectinated in the male, and most of the species are rather closely scaled. Venation, as usual, is an important feature in the recognition of this family in which ocelli or simple eyes are always present.

The larvæ are general feeders in most instances, but as a whole prefer low plants, *Plantago* being an all but universal food. A few of the species are sometimes troublesome in the garden, but they are easily controlled by hand-picking. Some, like the fall web-worm, may become serious pests.

Incidentally it may be said that under some circumstances the hairy covering of the larvæ may become poisonous. The hair is generally rough or barbed, and this, forced into the skin when handling caterpillars, may lead to unpleasant results.

EUBAPHE Hbn. = CROCOTA Hbn.

E. læta Guer. In dry woods in June (Bt).

E. opella Grt. Greenwood Lake, larvæ hiding by day in dead leaves of oak woods (Dyar), Jamesburg, VII, 4 (Lt), Lake Hopatcong (Pm).

E. immaculata Reak. In dry places in overgrown fields (Bt); more usual in the northern parts of the State, in my experience.

E. aurantiaca Hbn. Newark (Soc), Boonton (Ang, Bwl, Wdt), Lake Hopatcong (Pm), Avalon, VII, 5 (Kp). Anglesea (Lt), VIII, 21, V, 3, VI, 20, New Brunswick, IX, 18. Common in dry overgrown fields, June to September, throughout the State.

The varieties *rubicundaria*, *ferruginosa*, *brevicornis* and *quinaria* are based on the amount of black margin or the number of white spots in the wings.

The larvæ of all the species are general feeders on low plants.

HAPLOA Hbn. = CALLIMORPHA Latr.

H. clymene Brown. Newark (Soc), Fort Lee (Bt), Andover, VIII (Kr), Staten Island, VII and VIII (Ds).

H. lecontei Guer. Lake Hopatcong (Pm), and in its varieties throughout the State.

var. *confinis* Wlk. Only the oblique band complete.

var. *militaris* Harr. The oblique band broken.

var. *fulvicosta* Clem. No markings left.

The forms occur locally, the typical, fully marked *lecontei* being rare as is the immaculate type; *confinis* and *militaris* are the usual forms. The larvæ of all species seem to be rather general feeders.

- H. contigua* Wlk. Newark, Plainfield.
H. confusa Lyman. Fort Lee, VII (Erb).
H. vestalis Pack. Newark, VI (Kr), at light (Wdt).
H. triangularis Smith. Local near Newark (Ang).

UTETHEISA Hbn.

- U. bella* Linn. Common late August to early October in low meadows all along the coast and locally inland throughout the State. The larva feeds on cherry, elm, *Myrica*, *Crotalaria*, *Lespedeza*, etc.
 var. *hybrida* Butler. Bands of primaries incomplete, secondaries red : occurs with the type.
 var. *terminalis* N. & D. Secondaries white.

CYCNIA Hbn.= EUCHÆTES Harr.

- C. eglenensis* Clem. Fort Lee (Bt), Staten Island, VI (Ds), Newark (Soc). Two brooded, May and July, larva on milk-weed (Bt).
C. tenera Hbn.= *collaris* Fitch. Quite generally distributed, the larva on Dog-bane, *Apocynum* (Bt). Staten Island, VI and VII (Ds), Newark, V, VIII (Wdt).
C. oregonensis Stretch. Should occur in North Jersey.
C. egle Dru. Common all over the State, the larva on milk-weed. Two-brooded, first in June, second late July and August.

HALISIDOTA Hbn.

- H. tessellaris* A. and S. Common throughout the State. The larva is a general feeder, often a nuisance on shade trees in cities, sometimes troublesome in gardens and frequently found on fruit trees on which it does no serious harm.
H. maculata Harr. This is said to be rare near N. Y. (Bt), but becomes more common northwardly. The larva feeds on willow, alder, oak and poplar.
H. caryæ Harr. Also occurs throughout the State. The larva is a general feeder and found with that of *tessellaris*.

ECPANTHERIA Hbn.

- E. oclaria* Fab. = *scribonia* Stoll. Fort Lee (Bt), Staten Island (Ds), Newark (Soc), Woodbury, VI, 18 (Kp). Quite generally distributed but not common : the larva on *Plantago* and other low plants, also willow and locust.

ESTIGMENE Hbn. = LEUCARCTIA Pack.

- E. acræa* Dru. Common throughout the State, but especially along the coast, V, VI, VIII, IX. The larva is a general feeder and from its local abundance has been called the salt-marsh caterpillar.

HYPHANTRIA Harr.

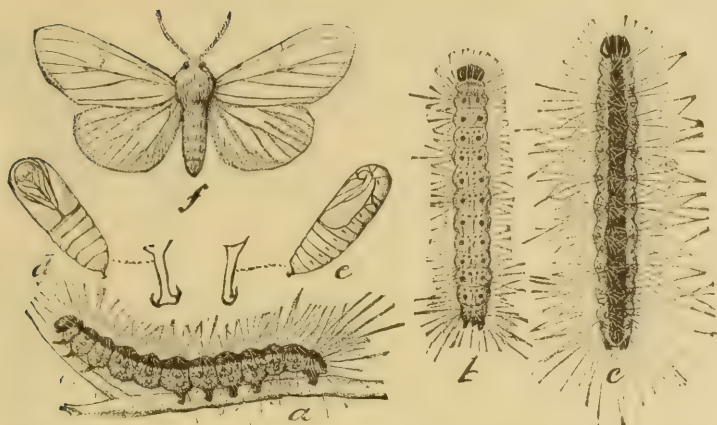


Fig. 184.—The fall web worm, *Hyphantria cunea*; a, b, c, varieties of larva; d, e, pupæ; f, moth of the normal white form.

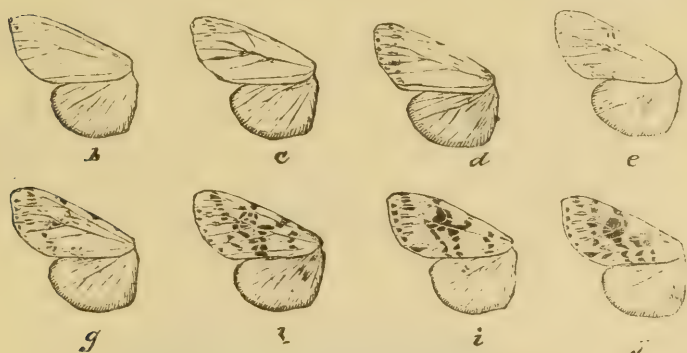


Fig. 185.—Varieties in wing markings of *Hyphantria cunea*.

H. cunea Dru. Common throughout the State. The larva is known as the "Fall Web-worm" because at this time the second brood makes conspicuous web nests or tents on a large variety of shade and orchard trees. Pulling down the nests and spraying with arsenites for the first brood, or thorough spraying for the second, is indicated.



Fig. 186.—Female *Hyphantria* ovipositing on under side of leaf; b, a little group of eggs enlarged

PYRRHARCTIA Pack.

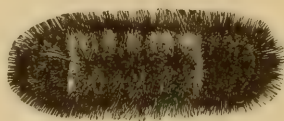
P. isabella S. and A. Common throughout the State and double-brooded, April to June and August. The larva is a general feeder and often in gardens; it hibernates, and is frequently conspicuous by its banded black and brown appearance.



c

PHRAGMATOBIA Steph.

P. fulginosa Linn. = *rubricosa* Harr. Caldwell (Cr), Jersey City, VI, at light (Kr), Newark, VII (Bwl), Anglesea (Lt), Lake Hopatcong (Pm). The larva feeds on golden rod, skunk-cabbage, iron weed and other plants.



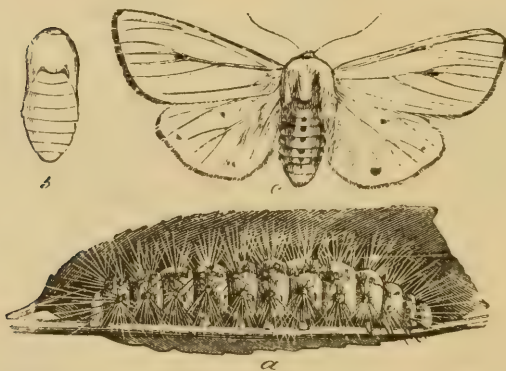
a



b

Fig. 187.—*Pyrrharctia isabella*: a, larva; b, pupa in cocoon; c, female moth.

SPILOSOMA Steph.



a

Fig. 188 — *Spilosoma virginica*; a, larva; b, pupa; c, adult.

S. virginica Fabr. Common throughout the State and two-brooded. The larva is a general feeder, and is the common white or reddish woolly caterpillar so often seen in gardens, feeding on all kinds of vegetables. Adults occur from May throughout the summer.

S. antigone Strck. Fort Lee (Bt), Newark, VI, 24 (Sb), Staten Island (Ds), Lake Hopatcong (Pm). The larva is a general feeder (Dyar), and often bores into the stems of large mushrooms (Bt).

- S. latipennis* Stretch. Staten Island, V and VI (Ds). In swampy meadows, the larva on Jack-in-the-pulpit, touch-me-not, Plantago, other low plants and wild cherry (Bt), not rare locally (Wdt).

EUPREPIA Ochs. = ARCTIA Schrank.

- E. virgo* Linn. Hopatcong (Bt, Pm), Caldwell (Cr). Larva on plantain, lettuce and other low plants.
- E. virguncula* Kirby. Newark (Soc), very rare, near N. Y. (Bt), Hopatcong (Pm), and probably general though rare in north Jersey.
- E. michabo* Grt. New Brunswick, July, at light.
- E. parthenice* Kirby. = *saundersii* Grt. Hopatcong (Bt), Newark (Soc).
- E. anna* Grt. Greenwood Lake (Dyar), Woodbury, VII, 18 (Kp).
var. *persephone* Grt. Rare near N. Y. (Bt), Newark, rare (Wdt).
This is the more usual form with partly yellow hind wings.
- E. arge* Dru. Throughout the State, but more common northward. Caldwell (Cr), Weehawken, VI-VIII (Bt), Staten Island, VII and VIII (Ds), Newark, V, 21 (Sb), New Brunswick, V, 8, etc. The larva on Plantago, Chenopodium, Polygonum and other low plants.
- E. phyllira* Dru. Caldwell (Cr), Newark (Soc), Woodbury, VI, 8 (Kp).
var. *figurata* Dru. Rare near Newark. The larva is a general feeder on low plants.
- E. nais* Dru. Common throughout the State, V, VI, VIII, IX: the larva on low plants.
- E. phalerata* Harris. Occurs with the preceding.
- E. vittata* Fabr. Occurs with the two preceding, these three being quite usually confused in collections.

Family NOLIDÆ.

Small, rather slight, broad-winged moths, in general resembling the Lithosiidæ, but with ashen gray colors and streaky zig-zag black markings. The larvæ also resemble the preceding, but the anterior pair of abdominal feet is aborted.

ARGYROPHYES Grt.

- A. pustulata* Wlk. = *nigrofasciata* Zell. New Brunswick at light, rare, in June.
- A. cilicoides* Grt. "Atlantic States" (Dyar). I have seen a New Jersey specimen of this species; but have no record.

NOLA Leach.

- N. melanopa* Zell. Newark, New Brunswick.

N. ovilla Grt. Ft. Lee, V and VI, the larva on oak (Bt), Orange Mts., VI (Wdt), Hemlock falls, V, 15, Jersey City Hts., V, 8 (Sb), Newark, New Brunswick, Jamesburg, IV.

N. trinotata Wlk. Greenwood Lake, V (Bt), Westville, IV, 27 (Kp), Orange Mts., common on hemlock, VII and VIII (Wdt), Newark (Sb), New Brunswick; larva on Witch hazel.

N. clethræ Dyar. Larva feeds on *Clethra alnifolia*, and is quite certain to be found with us.

CLEMENSIA Pack.

C. albata Pack. Newark, rare; flies in June.

Family AGARISTIDÆ.

Medium sized moths with bright contrasting colors, the antennæ slender, of equal thickness or somewhat enlarged toward the tip. The caterpillars are curiously banded with red, brown and gray.

ALYPPIA Hbn.

A. octomaculata Fabr. Common in cities and large towns in June and July: the larva feeds on grape and is sometimes destructive on garden vines; but rarely occurs in the open country, where it also feeds on virginia creeper. Arsenites are indicated to keep it in check.

PSYCHOMORPHA Harr.

P. epimenis Dru. Hopatcong (Bt), Newark (Soc), Staten Island, IV (Ds), Irvington, the larva in June webbing up leaves of grape, but not really injurious: moths about the middle of April.

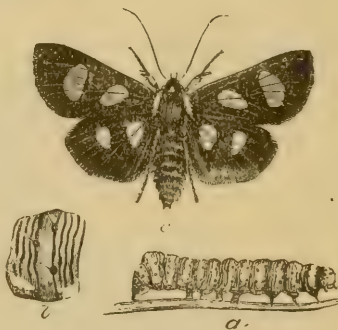


Fig. 189.—*Alysia 8-maculata*; a, larva; b, an enlarged segment; c, adult.

EUDRYAS Bdv.

E. unio Hbn. Throughout the State, but local; Hopatcong (Bt), Newark (Soc), VI (Sb), Caldwell (Cr), Staten Island, VI (Ds): larva on evening Primrose and *Epilobium coloratum*. Moths again in August.

E. grata Fabr. Hopatcong (Bt), Del. Water Gap, VII, 9 (Jn), Caldwell (Cr), Staten Island, VI, VII (Ds), Newark, V (Wdt), generally distributed but local; the larva on grape and virginia creeper.

Family PANTHEIDÆ.

These species resemble the owlet moths, but the thorax is shorter, more squared, the head somewhat retracted. They have the same general appearance however and are separated chiefly upon characters of venation. None of the species are injurious.

PANTHEA Hbn.

P. furcilla Pack. Not actually taken, but certain to be found in the State : the larva on larch and pine.

DEMAS Stephens.

D. propinquinelinea Grt. Has been taken along the borders of the State and will certainly be found within it : the larva on birch, walnut, maple, oak, beech.

D. flavicornis Smith. Newark, in May, taken rarely.

CHARADRA Wlk.

C. deridens Gn. Newark, light, in May (Wdt) : the larva makes a nest on leaves of oak (Dyar) and feeds also on birch and elm.

RAPHIA Hbn.

R. frater Grt. Fort Lee (Bt), Jersey City, VII, 21, VIII, 3 (Sb), Staten Island (Ds) : the curious larva on leaves of poplar and willow.

Family NOCTUIDÆ.

These are the owlet moths, with plump, robust bodies, short, stiff, triangular primaries and broader secondaries. The antennæ are usually about half the length of the forewings or a little longer, simple, bristled, or, in the males, sometimes pectinated. They are rarely seen during the day, and derive their common name, "owlets," from their night-flying habits, their eyes in many cases glowing with a phosphorescent light. During the day they hide under bark or stones, in out-houses, or wherever they can find shelter. Occasionally they sit brazenly upon the trunks of trees or openly upon stones, their colors and markings blending so perfectly with their surroundings that they are invisible, except to the trained eye ; but at night they fly readily, many of them being attracted to light.

The caterpillars vary considerably, but many of them are well known as "cut-worms," and decidedly injurious. These may be controlled by using the bran and paris green bait which is elsewhere described. The insects are fond of the bran and will eat it in preference to their normal food. It should be placed at the base of the hills to be protected when plants are set out.

Specially injurious forms will be noted under the insect heading.

ACRONYCTA Ochs.

- A. rubricoma* Gn. Newark (Wdt), and probably generally distributed, III to IX. The larva feeds on Hackberry (*Celtis*). It may be well to say that food plants in this genus, when not especially credited, are given on the authority of Dr. Dyar. The insects are known as "dagger moths" because there are on the wings short dashes like a Greek *ψ* *psi*.
- A. americana* Harr. Throughout the State, and usually common. Jersey City, VI (Kr), Staten Island, VI and VII (Ds), Caldwell (Cr), Newark, VII (Wdt), V, 24 (Sb), New Brunswick. The larva on maple, elm, chestnut, linden, poplar, birch, alder, oak, hickory, ash, sycamore.
- A. hastulifera* Sm. and Abb. Hopatcong (Pm), Newark (Soc), rare near New York (Bt), and should occur throughout the State in May and June. The larva feeds on alder (Dyar) and maple (Bt).
- A. dactylina* Grt. New Jersey, VI, 23, on white birches near Newark (Ang), at light, V (Wdt), Gloucester, VI, 2 (Lt). The larva feeds on alder, birch and willow.
- A. leporina* Linn. Not actually recorded from the State, which is, however, well within the territory covered by the species. The larva on poplar, willow and birch.
- A. populi* Riley. Recorded from Long Island and certain to occur in northern New Jersey: flies in May and June. The larva on poplar.
- A. lepusculina* Gn. Recorded from Long Island to New Hampshire and Florida and sure to occur in New Jersey.
- A. innotata* Gn. Staten Island, VI (Ds). The larva is said to feed on hickory.
- A. betulæ* Riley. Staten Island, VI and VII (Ds): I have also seen specimens actually taken in New Jersey. The larva feeds on birch.
- A. morula* Grt. & Rob. New Brunswick, VII. The larva feeds on elm, apple and linden.
- A. occidentalis* Grt. & Rob. Common throughout the State V to IX. Newark, V (Bwl), VI, VII, VIII (Wdt). The larva is not uncommon on elm at New Brunswick and feeds also on apple, plum, cherry and birch.
- A. lobeliæ* Gn. Not rare throughout the State. Jersey City (Kr), Newark, V, 2, 22, VII, 18 (Sb), Elizabeth, VIII, 4 (Kp), Staten Island, VII and VIII (Ds). The larva feeds on oak.
- A. furcifera* Gn. Newark, light, VII (Wdt). The larva feeds on wild-fire-and choke cherry.
- A. hasta* Gn. Not uncommon in various parts of the State; but I have no dates.
- A. lætifera* Smith. Orange Mts., VII (Wdt). Has been confused with *furcifera*, and I have several specimens from the State without dates.
- A. vinnula* Grt. Newark, VI, 27, VII, 16 (Sb), Staten Island, VII (Ds), New Brunswick, VI and VII. The larva feeds on elm.
- A. fragilis* Gn. Has been recorded from New Jersey without definite locality or date. The larva feeds on birch, mountain ash and apple.

- A. lithospila* Grt. Newark, VI and VII (Wdt) : is generally distributed but rare. The larva feeds on hickory, oak, chestnut.
- A. funeralis* Grt. and Rob. Recorded from Long Island, from near Philadelphia in Pennsylvania, and certain to be found in New Jersey. The larva feeds on hickory, birch, elm and apple.
- A. tritona* Hbn. Hopatcong (Pm). Staten Island, VI and VII (Ds), Clementon, V, 9 (Lt). The larva feeds on cranberry, deerberry and *Azalea viscosa*.
- A. grisea* Wlk. Newark (Soc), New Brunswick rare. The larva on apple, birch, willow, elm and arrow-wood.
- A. connecta* Grt. Jersey City, VII, at sugar (Kr), Staten Island, VIII (Ds), Elizabeth, VIII, 6 (Kp). The larva feeds on willow.
- A. brumosa* Gn. = *subochrea* Grt. Jersey City at sugar VI (Kr), Newark, V (Sb), VII (Wdt), Staten Island (Ds). The larva on witch hazel.
- A. superans* Gn. Newark (Ang), Caldwell (Cr), Hopatcong (Pm), and should be found generally distributed. The larva feeds on plum, apple, cherry, birch, mountain ash and probably other plants.
- A. spinigera* Gn. Staten Island, VIII (Ds), and will undoubtedly be found elsewhere in the State.
- A. pruni* Harr. = *clarescens* Grt. nec. Gn. Caldwell (Cr), Newark (Soc), Orange Mts., VII (Wdt), New Brunswick, VI and VII, and is generally distributed. The larva feeds on apple, mountain ash, wild cherry, cherry and plum.
- A. afflicta* Grt. Jamesburg, VII, 4 (Lt), Newark, IX, 9 (Kp, Wdt), and will undoubtedly occur elsewhere in the State. The larva feeds on oak (Dyar) and Walnut (Bt).
- A. ovata* Grt. Not uncommon throughout the State, but usually confused with *hamamelis*. It flies from May to July. Orange Mts., VI (Wdt), Newark, VI and VII (Bwl). The larva feeds on oak, beech and chestnut.
- A. exilis* Wlk. New Brunswick (Sm), near New York (Bt), June and July. The larva feeds on oak.
- A. clarescens* Gn. = *hæsitata* Grt. Also generally distributed, not uncommon and confused with *hamamelis* in collections : it flies in June and July. Boonton, VII (Bwl).
- A. hamamelis* Gn. Common throughout the State : Jersey City, VII (Kr), Newark, V, 27 (Sb), VI (Wdt), Caldwell (Cr), Staten Island, VIII and IX (Ds), Woodbury, VII, 30 (Kp), New Brunswick, VII. The larva feeds on oak, chestnut and birch.
- A. increta* Morr. A single specimen from New Jersey has been seen ; but I have no doubt the species will be found not uncommonly when its food habits are known. The moths seem to fly very early.
- A. retardata* Wlk. = *dissecta* Grt. Quite generally distributed and not rare. Caldwell (Cr), Montclair, VIII (Wdt), Newark (Sb), Woodbury, VI, 8 (Kp), New Brunswick, VI and VII. The larva feeds on maple.
- A. luteicoma* Grt. and Rob. At sugar, Jersey City, VI (Kr), Newark, IV (Wdt). The larva feeds on a considerable variety of orchard and forest trees ; but is not injurious.

- A. sperata* Grt. Has been taken by the Newark collectors and should be found generally distributed in May and June. The larva feeds on poplar and alder.
- A. noctivaga* Grt. Caldwell (Cr), Orange Mts, V (Wdt), Newark (Soc), Staten Island, V (Ds). The larva feeds on poplar and various low plants.
- A. impressa* Wlk. = *brumosa* Grt. nec. Gn. Quite generally distributed and not rare. Chester (Dn), Hopatcong (Pm), Newark, V, 23 (Sb), Jersey City, at sugar, VI (Kr), Staten Island, (Ds). The larva is quite a general feeder on orchard and small fruits (except peach) and also on a variety of forest trees (Dyar and Bt).
- A. distans* Grt. Generally distributed and confounded in collections with *impressa*. Tho larva feeds on poplar, willow, birch and alder.
- A. xyliniformis* Gn. Bloomfield, VI, VII (Wdt), Elizabeth, VIII, 6 (Kp), "N. J." (Lt). The larva feeds on birch and blackberry.
- A. obliterata* Sm. and Abb. Common throughout the State, VI to VIII. The larva is a general feeder on orchard and small fruits and also on a variety of forest trees and other plants.

It is altogether probable that, in addition to what is listed above, *albarufa* and perhaps two or three others will also be found in New Jersey.

ARSILONCHE Led.

- A. albovenosa* Gœze. Rather common along the coast from Anglesea to New York, IV-IX, and more rarely taken throughout the State. The larva feeds on grasses, smartweed and willow.

HARRISIMEMNA Grt.

- H. trisignata* Wlk. Generally distributed but rare: Hopatcong (Pm), Caldwell (Cr), Newark (Soc), Staten Island, VI (Ds). A striking species in all stages. The larva feeds on lilac, winterberry and huckleberry (Dyar).

CERMA Hbn.

- C. cora* Hbn. Atco, rare (Lt).

POLYGRAMMATA Hbn.

- P. hebraicum* Hbn. Woodbury, VI, 18, VII, 20 (Kp), Newark (Ang), near New York (Bt), Del. Water Gap, VII, 12.

MICROCÆLIA Gn.

- M. diphtheroides* Gn. Hopatcong (Pm), Newark, VI, VII (Soc), Staten Island, VI (Ds), Caldwell (Cr), New Brunswick, and probably throughout the State.

The variety *obliterata* Grt., occurs with the type and is usually the more common.



Fig. 190.—Common owl moths of New Jersey: 1, *Agrotis ypsilon*; 2, *Peridroma saucia*; 3, *Noctua bicarnea*; 4, *Feltia subgothica*; 5, *Noctua c-nigrum*; 6, *Noctua clandestina*; 7, *Carneades tessellata*; 8, *Mamestra trifolii*; 9, *Hadena arctica*; 10, *Feltia malefida*; 11, *Carneades messoria*; 12, *Hadena devastatrix*.

BRYOPHILA Tr.

B. lepidula Grt. Caldwell (Cr), and I have seen it from other parts of the State.

B. teratophora H. S. Newark district, New Brunswick.

CHYTONIX Grt.

C. palliatricula Gn. Throughout the State in July; but nowhere common.

MOMA Hbn.

M. fallax H. S. Caldwell (Cr), Newark, V, 25 (Sb), Staten Island, V (Ds), Westville, VIII, 19 (Jn): the curious banded larva on poplar, and on *Viburnum dentatum* (Dyar).

FERALIA Grt.

F. jocosa Gn. Newark district, III and IV: larva on hemlock (Soc).

F. major Smith. Should be found in the State, as it occurs both to the north and to the south of us.

RHYNCHAGROTIS Smith.

R. rufipectus Morr. Should occur in the northern part of the State.

R. brunneicollis Grt. Newark, VI-IX (Wdt), New Jersey (Bt).

R. anchoceloides Gn. = cupida Grt. Westville, VII, 2 (Lt), Newark, VIII, 5 (Sb), Staten Island, IX, X (Ds), Anglesea, IX: the larva feeds on grape (Bt) and, like other cut-worms, on a variety of other plants.

R. placida Grt. Elizabeth, VIII, 4 (Kp).

R. alternata Grt. Newark (Ang), VII (Wdt), Camden (Kp), Staten Island, VIII, IX (Ds).

ADELPHAGROTIS Smith.

A. prasina Fabr. Newark, VII (Wdt), IX, 18 (Sb), Hopatcong (Pm), Staten Island, VII and VIII (Ds).

PLATAGROTIS Smith.

P. pressa Grt. Lake Hopatcong (Pm).

EUERETAGROTIS Smith.

E. sigmoides Gn. Newark (Soc), Hopatcong (Pm).

E. perattenta Grt. Newark (Wdt), Staten Island, VI (Ds).

E. attenta Grt. Occurs rarely near New York (Bt).

SEMIOPHORA Steph.

S. elimata Gn. Staten Island (Ds).

S. opacifrons Grt. Rare near New York (Bt).

S. catherina Grt. Recorded from "N. J.," without definite locality.

PACHNOBIA Gn.

P. monochromatea Morr. Near Newark, very rare.

P. manifesta Morr. Near Newark early in Spring, a few examples each year; Mr. Seib has bred it from a larva with curious feeler-like processes found under leaves in a swamp.

AGROTIS Tr.

A. badinodis Grt. Caldwell (Cr), Newark (Bwl), Staten Island, VII (Ds),
rare near New York (Bt).

A. violaris G. and R. Riverton, IX, 20 (Jn).

A. ypsilon Rott. Common throughout the State from May to November: the larva is one of the injurious cut-worms and is a general feeder.

A. geniculata G. and R. Caldwell (Cr), Cape May Co., one specimen (Lt).

NOCTUA Linn.

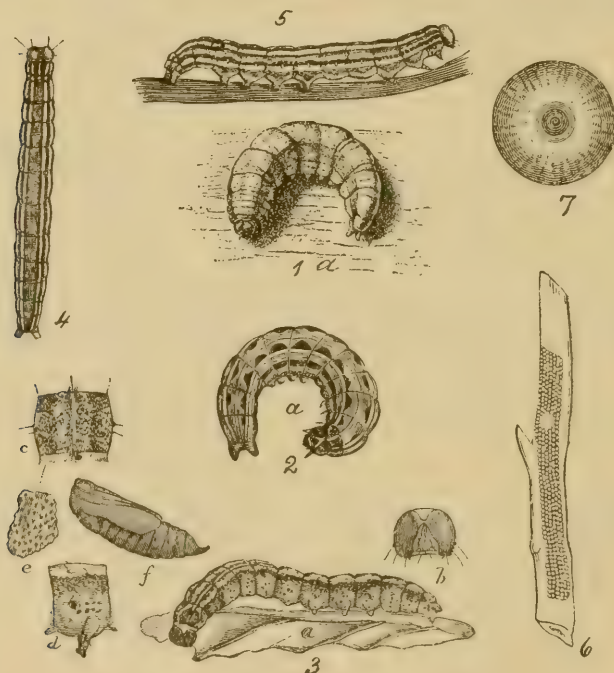


Fig. 191.—Cut-worms of typical forms; eggs natural size (6) and enlarged (7).

N. smithii Snell.=baja † Auct. New Brunswick and northward throughout the State, and will probably be found throughout South Jersey as well : all records are in August.

- N. normaniana* Grt. Hopatcong (Pm), Staten Island, VIII (Ds), Caldwell (Cr).
- N. bicarnea* Gn. Throughout the State, VII-X: the larva a general feeder on low plants; but not usually troublesome.
- N. c-nigrum* Linn. Common throughout the State, VII-XI; the larva is one of the injurious cut-worms.
- N. phyllophora* Grt. Hopatcong (Bt), Newark, V and VI (Sb), at light, VII and VIII (Wdt); larva in March (Sb).
- N. plecta* Linn. Throughout the State, V-IX: the larva feeds on celery, lettuce, etc.; but has not appeared anywhere as an injurious species.
- N. haruspica* Grt. Hopatcong (Pm), and undoubtedly elsewhere in Northern Jersey.
- N. clandestina* Harr. Common throughout the State, V, VI, VII, and VIII, IX, concealed under bark, etc.: the larva is one of the more injurious cut-worms.
- N. lubricans* Gn. Boonton, VIII, Elizabeth, VIII, 13 (Kp), Newark, VIII (25), and probably throughout the State.

PERIDROMA Hbn.

- P. occulta* Linn. Anglesea, IX, 5 (Lt), Staten Island, VIII (Ds), Newark at light (Wdt).
- P. saucia* Hbn. Throughout the State, July to November; the larva is one of the injurious cut-worms and a general feeder.
- P. incivis* Gn. Jersey City, VII, sugar (Kr), Staten Island, VIII and X (Ds), Elizabeth, IX, 16 (Kp), Newark, Boonton, IX (Bwl), Caldwell (Cr).

RHIZAGROTIS Smith.

- R. acclivis* Morr. Rare near New York (Bt). Have never seen it, myself, from any point in the east.

FELTIA Wlk.

- F. subgothica* Harv. Occurs throughout the State, more abundant late in the season and the most common of the allied species.
- F. jaculifera* Gn. With the preceding, but less abundant and in some localities entirely wanting.
- F. herilis* Grt. Also occurs throughout the State, but more rarely than the others of this little series.
- F. gladiaria* Morr. Hopatcong (Pm), Newark, at light, IX and X, Staten Island (Ds), New Brunswick, IX, 18, and should occur throughout the State.
- F. venerabilis* Wlk. Newark, IX, 15 (Wdt), Staten Island, IX, (Ds), and undoubtedly elsewhere in the State.
- F. volubilis* Harv. Newark, light, X (Wdt); sure to occur elsewhere in the State.

F. annexa Tr. Staten Island, VIII and IX (Ds), Anglesea at sugar, IX (Lt), probably throughout South Jersey; the larva is a general feeder and sometimes injurious.

F. malefida Gn. Trenton (U S Ag), Anglesea, IX, and probably throughout South Jersey.

POROSAGROTIS Smith.

P. vetusta Wlk. = *murænula* G. and R. Anglesea, IX, 28 (Lt), Camden, IX, 13 (Kp), and occurs on golden-rod during its prime in September throughout the State.

P. mimallonis Grt. Near New York, common (Bt).

P. tripars Wlk. Lahaway in June, common.

CARNEADES Grt.

C. velleripennis Grt. Atco, VIII, 2 (Lt), Newark (Soc).

C. fumalis Grt. Rare near New York (Bt).

C. detera Wlk. = *pitychrous* Grt. Throughout the State; but especially common near the shore on golden-rod, late in fall, flying in the bright sunlight.

C. bostoniensis Grt. Staten Island, IX, X (Ds), rare near New York (Bt).

C. messoria Harris. Common throughout the State, June to September: the larva is the most injurious of the cut-worms in South Jersey, especially on sweet potatoes.

C. tessellata Harr. Throughout the State, June to September: the larva of this species is also locally injurious.

C. albipennis Grt. Newark (Ang).

C. obeliscoides Gn. New Jersey is well within the range of this species; though I have as yet no record.

C. redimicula Morr. Staten Island, VII (Ds).



Fig. 192.—The reaping rustic, *Carneades messoria* and its larva.

ANYTUS Grt.

A. privatus Wlk. = *sculptus* Grt. Throughout the State, not common, VIII and IX.

PSAPHIDIA Wlk. = DICOPIS Grt.

P. grotei Morr. "New Jersey": no exact locality.

P. resumens Wlk. = *muralis* Grt. Newark (Hampsen) and I have seen other examples from the same general district.

P. thaxterianus Grt. Should be found in our State.

EUTOLYPE Grt.

E. rolandi Grt. Occurs from Massachusetts to Texas; always rare.

MAMESTRA Ochs.

M. nimbosa Gn. Caldwell (Cr), Newark (Soc).

M. imbrifera Gn. Caldwell (Cr), Newark (Soc).

M. purpurissata Grt. Not common near New York (Bt).

M. meditata Grt. Throughout the State, VIII and IX, commonly.

M. lustralis Grt. Have no actual records, but the species should certainly occur in the State.

M. detracta Wlk. Newark in June (Sb).

M. distincta Hbn. Caldwell (Cr), Newark (Ang), in April (Sb); larva on grape, etc. (Bt).

M. atlantica Grt. "New Jersey," without definite locality.

M. subjuncta G. and R. Staten Island, VI, VII, VIII (Ds), Jersey City, V (Kr), Newark, V, VIII (Sb, Wdt), Elizabeth, VIII, 19 (Kp), Chester (Dn): larva on cabbage, &c., and sometimes injurious.

M. grandis Bdv. Newark, VI, 20 (Wdt), VIII, 6 (Kp), and probably g. d.: larva on burdock and other low plants.

M. trifolii Rott. Throughout the State, V to X, common; larva on cabbage, clover, *Chenopodium*, etc.; sometimes injurious.

M. rosea Harv. Newark, VIII, at light (Wdt).

M. congermana Morr. Newark, at light, rare (Wdt).

M. picta Harr. Throughout the State, VI and VIII: the larva is brightly marked with yellow, barred by black, and streaked, sometimes troublesome on cabbage, but feeds also on many other plants. Early spraying with the arsenites is indicated in this case.

M. cristifera Wlk. = *lubens* Grt. Newark, VI, larva on huckleberry, sumach and birch (Sb), Lake Hopatcong (Pm).

M. latex Gn. Staten Island, VI and VII (Ds), Orange Mts, VI (Wdt); a dirty brown larva on low plants (Dyar).

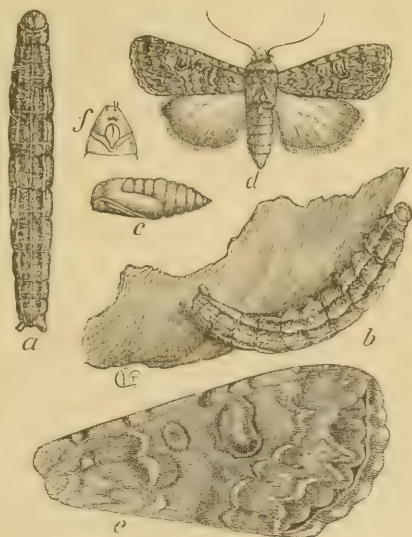


Fig 193.—*Mamestra trifolii*: a, larva from above; b, same on cabbage leaf; c, pupa; d, adult; e, wing of moth enlarged.

- M. adjuncta* Bdv. Recorded from all parts of the State in August : larva on golden rod and *Pteris aquilegia*.
- M. repentina* Morr. West Hoboken ; the type and only example ever taken.
- M. legitima* Grt. Staten Island, VIII (Ds), Jersey City, VII (Kr), Elizabeth, VIII, 19 (Kp), Boonton, VIII (Bwl), Hopatcong (Pm).
- M. lilacina* Harv. Newark (Ang), IX (Bwl).
- M. goodelli* Grt. Newark (Sb).
- M. ectypa* Morr. Morris Plains (Neum).
- M. renigera* Steph. Throughout the State and almost all season : larva a general feeder.
- M. olivacea* Morr. New Brunswick, VI, VIII, IX, Ocean County, VI, and undoubtedly occurs throughout the State.
- M. laudabilis* Gn. Andover, VIII (Kr), Newark (Soc), Bridgeton, IX, Iona, IV.
- M. lorea* Gn. Common near New York ; the larva on geranium, strawberry, &c. (Bt).

ULOLONCHE Smith.

- U. modesta* Morr. Occurs throughout the State, rarely.

TRACHEA Hbn.

- T. delicata* Grt. [Luceria]. Jersey City, VIII (Kr).

LUPERINA Bdv. = LUCERIA.

- L. passer* Gn. Chester (Dkn), Newark (Ang), New Brunswick, and probably throughout the State.
- L. burgessi* Morr. Elizabeth, IX, 16 (Kp), Cape May Co., one specimen, at light (Lt).

XYLOPHASIA Steph. = HADENA in part.

- X. remissa* Hbn. "New Jersey," without definite locality.
- X. suffusca* Morr. Newark (Soc).
- X. apamiformis* Gn. Riverton, VII, 31 (Ju), Camden, V, 28, Westville, VI, 29, Elizabeth, VIII, 19 (Kp), Newark, VI, 4-15, larva under stones (Sb).
- X. vultuosa* Grt. Jersey City, VI, VII (Kr).
- X. finitima* Gn. Jersey City, on raspberry bloom, in May (Kr).
- X. lateritia* Hbn. "New Jersey," without definite locality.
- X. dubitans* Wlk. = *sputatrix* Grt. Staten Island, VII, VIII (Ds), Jersey City (Kr), Newark, VII, VIII, 22 (Wdt), Caldwell (Cr), Boonton, VII (Bwl).
- X. impulsu* Gn. Staten Island, VI (Ds), New Jersey, without definite locality.
- X. devastatrix* Brace. Throughout the State all season. The larva is one of the most destructive of our field cut-worms.

- X. arctica* Bdv. Common throughout the State, VI to IX: larva cutting corn, cabbage, etc.
- X. verbascoides* Gn. Hopatcong (Pm), Elizabeth, VIII, 6 (Kp).
- X. cariosa* Gn. Newark, VI (Wdt), Jersey City, at sugar, VI (Kr).
- X. vulgaris* G. & R. "New Jersey" (Sm).
- X. lignicolor* Gn. Staten Island, VI (Ds), Newark, VIII (Wdt), Caldwell (Cr).

HADENA Schr.

- H. bridghami* G. and R. Seabright, on sun-flowers, Jersey City at sugar, VII (Kr); type locality "New Jersey."
- H. fractilinea* Grt. Hopatcong (Pm), New Brunswick, and probably throughout the State.
- H. miseloides* Gn. Jersey City at sugar, VI (Kr), Elizabeth, VIII, 9 (Kp), Newark, VI, VIII (Sb), Caldwell (Cr), Staten Island, VI and VIII (Ds), from a solitary, green larva on *Smilax* (Dyar): occurs throughout the State.
- H. viridimusca* Sm. "New Jersey," no locality or date.
- H. mactata* Gn. Have seen this in local collections.
- H. turbulenta* Hbn. Throughout the State, local, V, VI and VIII; larva gregarious on Horse-nettle, greenbrier or "*Smilax*."
- H. modica* Gn. Andover at sugar, VIII (Kr), Staten Island, VI, VII and VIII (Ds), Newark, VII (Bwl, Kp), Snake Hill, VII (Wdt).
- H. hausta* Grt. Newark, Jersey City Hts., IV, 20 (Sb).
- H. diversicolor* Morr. Rare near New York (Bt).

HILLIA Grt.

- H. crasis* H. Sch. Hopatcong (Pm).

OLIGIA Hbn.

- O. festivoides* Gn. Throughout the State, IV, VI and VIII, and comes readily to light.
- O. chalconia* Hbn. Occurs with the preceding.
- O. grata* Hbn. Staten Island, VII and X (Ds), Elizabeth, IX, 16 (Kp), Newark, V, VIII, IX (Wdt), Anglesea (Lt).

LEPTINA Gn.

- L. dormitans* Gn. Newark, rare (Wdt), and probably throughout the State.
- L. doubledayi* Gn. Have seen New Jersey specimens.
- L. ophthalmica* Gn. Newark (Soc), Staten Island, V, VI (Ds), New Brunswick.

PERIGEA Gn.

- P. xanthioides* Gn. Boonton, VIII (Bwl), Caldwell (Cr), Jersey City at sugar, VII (Kr), Staten Island, VII, X (Ds), Newark, VI and IX (Wdt), Elizabeth, VIII, 4 (Kp), and occurs throughout the State.
- P. vecors* Gn. *luxa* Grt. Jersey City, V, VII (Kr), Staten Island, VIII and X (Ds), Newark, VIII and IX (Wdt, Sb), Elizabeth, VIII, 19, 22 (Kp), Anglesea, IX, 16 (Lt).
- P. epopea* Cram. = *infelix* Gn. Hopatcong (Pm), Jersey City at sugar, VII (Kr), Staten Island, IX, X (Ds), Elizabeth, VIII, 9 (Kp).
- P. claufacta* Wlk. = *fabrefacta* Morr. Occurs throughout the State, July to October.

DIPTERYGIA Steph.

- D. scabriuscula* Linn. Throughout the State, V-VIII : larva on *Rumex*.

HYPPA Dup.

- H. xylinoides* Gn. Throughout the State, V-IX, not rare.

HOMOHADENA Grt.

- H. badistriga* Grt. Newark district, larva on honeysuckle.

ONCOCNEMIS Led.

- O. riparia* Morr. Almost certainly occurs on the Staten Island shore.

ADITA Grt.

- A. chionanthi* S and *A.* Newark (Soc), and in single specimens elsewhere in the State.

MACRONOCTUA Grt.

- M. onusta* Grt. "New Jersey," Newark (Soc): the larva bores in roots of german lily (Dyar).

DRYOBOTA Led.

- D. illocata* Wlk. = *stigmata* Grt. Hopatcong (Pm), and probably throughout the State.

ACTINOTIA Hbn.

- A. ramosula* Gn. Ft. Lee (Bt), Staten Island, V-VIII (Ds), Newark, V (Bwl), Caldwell (Cr), Elizabeth, VII, 27 (Kp).

LAPHYGMA Gn.

- L. frugiperda* S. & A. Common throughout the State, VIII to X; the larva is the "fall army worm," feeding on grass crops and occasionally apple and other fruit trees: it was injurious in the fall of 1899.

PRODENIA Gn.

- P. commelina* S. & A. Throughout the State, VIII to X, the rarest of the species: the larva of this and the other species of the genus feed on grasses.
- P. ornithogalli* Gn. = *lineatella* Harv. Throughout the State, VIII-X, common.
- P. eudiopta* Gn. = *flavimedia* Harv. As before.

TRIGONOPHORA Hbn.

- T. periculosa* Gn. Chester (Dkn), Hopatcong (Pm); the variety *v-brunneum* Grt., occurs with the type.

EUPLEXIA Steph.

- E. lucipara* Linn. Throughout the State, June to September: larva on birch, *Viburnum* et als.

BROTOLOMIA Led.

- B. iris* Gn. Hopatcong (Pm), Jersey City (Sb), Newark, VI (Bwl).

NEPHELODES Gn.

- N. minians* Gn. Throughout the State in September, often on Solidago: the larva is sometimes locally injurious as a cut-worm on corn and other grasses. The variety *violans* Gn., is locally more common than the type form.

TRICHOLITA Grt.

- T. signata* Wlk. = *semiaperta* Morr. Andover, VIII (Kr), Newark (Ang).

HELOTROPHA Led.

- H. reniformis* Grt. Throughout the State, VI-IX, often common; the variety *atra* Grt., being really the most usual form.

HYDRÆCIA Gn.

- H. u-album* Gn. = *purpuripennis* Grt. Occurs rarely; but may be found throughout the State.
- H. velata* Wlk. = *sera* Grt. and Rob. Common everywhere, VI-VIII.
- H. atlantica* Sm. = *nictitans* ‡ Auct. Occurs throughout the State from VII-VIII. The larva bores in the stems of grasses.
- H. immanis* Gn. Local in the northern districts, the larva feeding in the crown roots of hops. Dates of flight are in August and September.
- H. inquæsitæ* G. and R. Hopatcong (Pm), and the species is probably general in distribution though not common. It flies in August and September.

- H. speciosissima* G. and R. Newark (Soc), Ridgewood, VIII, 30. By no means common.
- H. rigida* Grt. This will probably be found in the northern part of the State, as the southerly limit of its distribution. It flies in September.
- H. harrisii* Grt. Newark, one specimen (Sb); larva bores in *Heracleum lanatum*.
- H. purpurifascia* G. and R. Occurs throughout the northern part of the State wherever the wild columbine grows, and the larva bores in the roots of this plant. Dates of flight in August and September.
- H. nitela* Gn. Found throughout the State, the larva boring in the stalks of corn and other grasses, occasionally becoming somewhat injurious. It occurs also in the stalks of potato, tomato, aster, dahlia and other plants, sometimes damaging a crop locally. The flight ranges from July to September and the variety *nebris* occurs with the type.
- H. necopina* Grt. Occurs not uncommonly in Westchester County, N. Y., and will be certainly found in N. J., when sought for. The larva bores in the stalks of wild sunflower, *Helianthus giganteus* (Bird).
- H. limpida* Gn. Newark, IX, 5 (Sb), and probably occurs throughout the State, rarely.
- H. cerussata* Grt. Newark, IX, 28 (Sb). Larva bores in thistle and burdock (Bird).
- H. cataphracta* Grt. Caldwell (Cr), Newark (Soc), Anglesea (Lt). Occurs rarely throughout the State in September, the larva boring in thistle, burdock, elder and sunflower.
- H. circumlucens* Sm. Newark, and elsewhere in New Jersey. It has been confused with *marginidens*.
- H. rutila* Gn. Occurs throughout the State though scarcely common. It flies in August and September, and the larva bores in burdock and ragweed (*Ambrosia trifida*).
- H. appasionata* Harv. Occurs on Long Island, and will be found in New Jersey without much doubt.
- H. marginidens* Gn. A "New Jersey" specimen is in the College collection, and the insect probably occurs rarely throughout the State in September. Larva in burdock (Bird).
- H. furcata* Sm. Hopatcong (Pm), Carlstadt, where the larva has been found by Mr. Doll boring in the young shoots of Ash.

ACHATODES Gn.

- A. zeæ* Harr. Found throughout the State, the larva boring in corn, wheat and other grasses. It is occasionally rather plentiful in the larval stage; but has not yet been seriously injurious.

BELLURA Wlk. = ARZAMA.

- B. gortynides* Wlk. = *diffusa* Grt. Newark district: larva in stems of *Typha*, rare.

B. obliqua G. and R. Newark V and VI, common; larva in cat tails, easily taken during the winter when the stems are frozen in ice.

EUTHISANOTIA Hbn.

E. timais Cram. A Southern species which is occasionally taken at the lights along the shore cities as far north as New York.

NONAGRIA Ochs.

N. læta Morr. "Hoboken," according to its describer: it has never been definitely identified since.

N. subflava Grt. Rare near Newark.

SENTA Steph.

S. defecta Grt. "New Jersey," without definite locality.

PLATYSENTA Grt.

P. videns Gn. = *atriciliata* Grt. Anglesea, north to Jersey City, VI to IX, in swampy and marsh lands along shore and inland.

TAPINOSTOLA Led.

T. variana Morr. Newark, light, one specimen (Wdt).

OMMATOSTOLA Grt.

O. lintneri Grt. Anglesea, rare, VIII, 31 (Lt), very common, IX, 2, 1899 (Sm).

LEUCANIA Ochs.

L. pallens L. Newark, VII (Wdt), Elizabeth, VIII, 4 (Kp): the larvæ of all our species feed on grasses.

L. phragmatidicola Gn. Throughout the State, V-VIII.

L. albilinia Hbn. Common throughout the State, V to VIII. The larva is the "Wheat head army worm," and is sometimes destructive in the northern counties.

L. multilinea Wlk. = *lapidaria* Grt. Newark meadows at sugar (Sb).

L. insueta Gn. = *adonea* Grt. Hopatcong (Pm), Jersey City, VI, common (Kr).

L. commoides Gn. Anglesea, IX, New Brunswick.

L. flabilis Grt. Newark at light, VII, rare (Wdt), near New York (Bt).



Fig. 199.—*Leucania albilinea*.



Fig. 195.

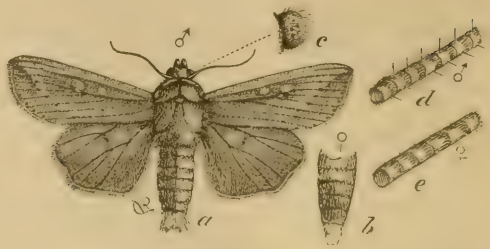


Fig. 197.



Fig. 194.

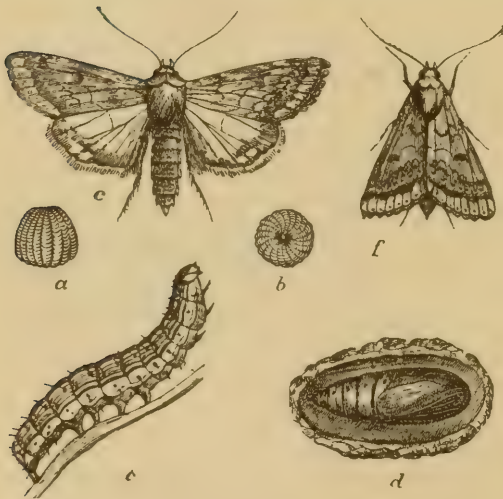


Fig. 198.



Fig. 196.

L. unipuncta Harv. Throughout the State all summer and until frost. The larva is the "army worm" and is sometimes seriously destructive locally or generally. Remedial measures consist of barriers and mechanical methods that cannot be detailed here.

L. pseudargyria Gn. Throughout the State IV-IX. common, but not injurious.

UFEUS Grt.

U. plicatus Grt. Newark (Sb).

SCOLECOCAMPA Gn.

S. liburna Geyer. Ft. Lee (Bt), Staten Island (Ds), Newark, VII (Sb), Hemlock Falls, and g. d.: the larva in decaying cherry, hickory, oak and chestnut stumps.

EUCALYPTERA Morr.

E. bipuncta Morr. In July, on salt marshes; the larva probably a borer in reeds or grasses.

DORYODES Gn.

E. bistrialis Geyer.=*acutaria* H. S. Newark, at light, V (Wdt), Anglesea, common on the salt marshes, VI-IX.

PHIPROSOPUS Grt.

P. callitrichoides Gn. Elizabeth, VIII, 19 (Kp).

AMOLITA Grt.

A. fessa Grt. Hopatcong (Pm), Anglesea, VI, 15, VII, 21, VIII, 14 (Lt), VIII, 23 (Kp).

RIVULA Gn.

R. propinqualis Gn. Newark, VI-IX, g. d. (Wdt), Elizabeth, VII, 24 (Kp).

BALSA Wlk. = NOLOPHANA Grt.

B. malana Fitch. Caldwell (Cr), Staten Island (Ds), Hemlock Falls, Newark, V (Sb), Elizabeth, VII, 24 (Kp), g. d. throughout the State; "a little green larva dotted with yellow" (Dyar), on apple.

B. triquetrana Fitch. Boonton, VIII (Wdt).

B. tristrigella Wlk. = *zelleri* Grt. Newark, V (Wdt), Hemlock Falls (Sb).

B. labecula Grt. Will also probably occur: we have it from New York (Dyar).

Fig. 194.—*Mamestra picta*: *a*, the "zebra caterpillar"; *b*, moth.

Fig. 195.—Wheat head army worm: *a, a*, larvæ at work on wheat head; *b*, egg mass; *c, d*, egg from above and side, enlarged.

Fig. 196.—Army-worm at work.

Fig. 197.—Army-worm moth, *Leucania unipuncta* and details.

Fig. 198.—*Heliothis armiger*: *a, b*, egg, enlarged, from side and above; *c*, larva; *d*, pupa in underground cell; *e*, adult, wings spread; *f*, same, wings closed.

CATABENA Wlk.

C. lineolata Wlk. Chester (Dkn), near New York on Verbena (Bt).

CRAMBODES Gn.

C. talidiformis Gn. Ft. Lee (Bt, Dyar), Staten Island, VIII (Ds), Hopatcong (Pm), Newark, VII (Wdt), Jersey City, IX (Sb); larva on Verbena.

CARADRINA Tr.

C. miranda Grt. Staten Island, VI (Ds), Newark, VIII (Wdt), Anglesea, VIII, 14 (Lt).

C. derosa Morr. Described from "New Jersey."

C. multifera Wlk. "New Jersey."

AMPHIPYRA Ochs. = PYROPHILA Hbn.

A. tragopogonis Linn. "New Jersey."

A. pyramidoides Gn. Throughout the State, V to IX: "one of the commonest larva of early spring" (Dyar), feeds on wild cherry, apple, poplar, chestnut and other plants.

ANORTHODES Sm.

A. prima Sm. Newark, VIII (Wdt).

ORTHODES Gn.

O. crenulata Butl. = *infirmata* Gn. Hopatcong to Anglesea, VI, VII and VIII.

O. cynica Gn. Hopatcong (Pm), Jersey City, sugar, VI (Kr), Newark, V and VI (Wdt), Elizabeth, VIII, 19 (Kp).

O. vecors Gn. = *enervis* Gn. Hopatcong (Pm), Staten Island, VIII (Ds), Newark, V, VII, VIII (Wdt).

HIMELLA Grt.

H. contrahens Wlk. Northern New Jersey.

H. intractata Morr. Newark (Ang), Staten Island, IV (Ds).

CROCIGRAPHA Grt.

C. normani Grt. Newark, in April, on willow catkins (Sb).

TÆNIOCAMPA Gn.

T. culea Gn. Newark (Ang).

T. oviduca Gn. Newark (Erb), and common throughout the State.

- T. alia* Gn. Throughout the State, late in fall and again in March and April : larva a general feeder in early spring (Dyar).
T. subterminata Smith. Newark in April, on willow blossoms (Sb).

CALYMNIA Hbn.

- C. orina* Gn. Not actually taken in the State, but so distributed as to occur almost certainly.

IPIMORPHA Hbn.

- I. pleonectusa* Grt. Recorded from "New Jersey."

ATETHMIA Hbn.

- A. rectifascia* Grt. Recorded from "New Jersey."

COSMIA Ochs.

- C. paleacea* Esp. Chester (Dkn).

PYRRHIA Hbn.

- P. umbra* Hbn. Staten Island, VIII (Ds), Newark, VI (Sb), Caldwell (Cr): larva on *Desmodium* and blackberry.
P. exprimens Wlk. With the preceding but more rarely.

PARASTICHTIS Hbn.

- P. discivaria* Wlk. Have no actual records, but the species will certainly be found.

ORTHOSIA Ochs.

- O. bicolorago* Gn. Throughout the State, VII to XI, the var. *ferruginoides* Gn., quite as plentiful as the type.
O. aurantiago Gn. I have a New Jersey specimen without data.
O. conradi Grt. "New Jersey."
O. helva Grt. Hopatcong (Pm), Caldwell (Cr), Bayonne (Bt), Staten Island, VIII (Ds), Elizabeth, VIII, 19 (Kp).
O. lutosæ Andr. Recorded from New Jersey.

GLÆA Hbn.

- G. viatica* Grt. "New Jersey."
G. inulta Grt. Staten Island, IX (Ds), Caldwell (Cr).
G. signata French. "New Jersey."
G. sericea Morr. Ft. Lee (Bt), Newark, X (Wdt), Staten Island, X (Ds).

EPIGLÆA Grt.

- E. pastillicans* Morr. Found near New York (Bt).
E. apiata Grt. Certain to be found in our State.
E. decliva Grt. Certainly occurs with us.

XANTHIA Ochs.

- X. flavago* Fabr. Recorded as rare near New York (Bt).

JODIA Hbn.

- J. rufago* Hbn. Newark, IV, on willow bloom (Sb).

CIRRÆDIA Gn.

- C. pampina* Gn. Caldwell (Cr). Newark, IX (Sb), Bayonne (Bt), Staten Island, IX, X (Ds). Elizabeth, IX, 27 (Kp).

SCOLIOPTERYX Germ.

- S. libatrix* Linn. Throughout the State, May to October, and hibernates as an adult: larva on willow and poplar.

SCOPELOSOMA Curtis.

- S. indirecta* Wlk. = *græfiana* Grt. Caldwell (Cr), Forest Hill, III (Wdt), Newark, III and IV (Sb). This and all others are found in fall and spring, hibernating as adults.
S. moffatiana Grt. Newark district, X and XI (Soc); larva on Witch hazel (Dyar).
S. pettiti Grt. Occurs near New York (Bt).
S. ceromatica Grt. Recorded from "New Jersey."
S. tristigmata Grt. Newark, New Brunswick, IX, and probably throughout the State.
S. walkeri Grt. Newark, IV, on willow bloom and sugar (Sb).
S. sidus Gn. Newark district in September (Soc).
S. morrisoni Grt. Staten Island, II, 16 (Ds), near New York on oak (Bt).
S. devia Grt. Newark, IV (Sb).

LITHOLOMIA Grt.

- L. napæ* Morr. Rare near New York (Bt).

XYLINA Ochs.

- X. signosa* Wlk. = *petulca* Grt. Hopatcong (Bt), Caldwell (Cr): all the species hibernate as adults.

- X. ferrealis* Grt. Hopatcong (Pm), New Brunswick, IV.
X. innominata Smith. Occurs throughout the northern portion of our State.
X. bethunei G. and R. Occurs throughout the State, and is one of the most common, aside from *antennata*.
X. fagina Morr. Chester (Dkn).
X. antennata Wlk. Throughout the State; the commonest species: the larva on a great variety of fruit and forest trees.
X. laticinerea Grt. Hopatcong (Pm), Staten Island, II-IV, and X, XI (Ds): larva on soft maple (Dyar), cherry and other trees.
X. grotei Riley = *cinerosa* Grt. Hopatcong (Pm).
X. unimoda Lint. Newark (Ang), Staten Island (Ds).
X. thaxteri Grt. Newark (Sb).

MORRISONIA Grt.

- M. sectilis* Gn. Newark, IV, 28, V, 2, on willow bloom (Sb). The variety *vomerina* Grt., occurs with the type.
M. confusa Hbn. Staten Island, V (Ds), Caldwell (Cr), Newark, larva on willow, &c., solitary in webbed-up leaf.

CALOCAMPA Steph.

- C. nupera* Lint. Occasional in North Jersey.
C. cineritia Grt. Newark, IV, 19, 27, on willow catkins, larva, X, 23, on low willows; must be sought at night with lantern (Sb).
C. curvimacula Morr. Occasional in North Jersey.

CUCULLIA Schr.

- C. convexipennis* G. and R. Newark and northward, VI, VII, VIII: on *Solidago* (Kr).
C. asteroides Gn. Hopatcong to Anglesea, and recorded on all lists VII, VIII, IX, also on *Solidago*.
C. intermedia Speyer. Hopatcong (Pm), Newark, VIII (Wdt).

EUTELIA Hbn.

- E. pulcherrima* Grt. Newark at light (Ang).

MARASMALUS Grt.

- M. inficita* Wlk. = *histrion* Grt. Caldwell (Cr), Newark, VII, 7 (Sb).
M. ventilator Grt. Newark (Soc), Anglesea, VIII, 14 (Lt): both of these species undoubtedly occur throughout the State.

INGURA Gn.

- I. delineata* Gn. Newark (Bwl), Morris Plains, larva on sweet gum (Dyar).
I. abrostoloides Gn. Staten Island, VI-IX (Ds), Newark (Sb), Elizabeth, IX, 9 (Kp).
I. oculatrix Gn. Hopatcong (Bt), Caldwell (Cr), Staten Island, VIII (Ds).

ANOMIS Hbn.

- A. erosa* Hbn. Newark, X (Wdt), Staten Island, X (Ds): larva on mallow and cotton. Really a southern species, but found northwardly each year.

ALETIA Hbn.

- A. argillacea* Hbn. Newark, IX, X (Wdt), Long Branch (U S Ag), Staten Island, IX and X (Ds), Elizabeth, IX, 16 (Kp), Anglesea, X, 10, 1897, very common. The famous cotton-moth: does not breed in our State, but flies up from the South in considerable numbers each year.

OGDOCONTA Butler = TELESILLA H. S.

- O. cinereola* Gn. Throughout the State, VI to IX: larva on Ragweed.

ABROSTOLA Ochs.

- A. ovalis* Gn. Newark (Sb).
A. urentis Gn. New Brunswick and probably throughout the State.

DEVA Wlk.

- D. purpurigera* Wlk. "Rare near New York" (Bt): the larva on meadow rue.

PLUSIA Fabr.

- P. ærea* Hbn. Newark, VII, 16, on Verbena, IX, 18, electric light (Sb), VI to VIII (Wdt), Forest Hill, VIII, 14 (Kp), Caldwell (Cr), Bayonne (Bt), Staten Island, VIII, IX (Ds).
P. æroides Grt. Jersey City, VII, VIII (Kr).
P. balluca Geyer. Newark, rare (Ang).
P. contexta Grt. Caldwell (Cr), Newark, VII, 20, VIII, 15 (Sb).
P. putnami Grt. "New Jersey."
P. venusta Wlk. Newark at light (Ang).
P. formosa Grt. Rare near Newark (Soc).
P. thyatiroides Gn. Hopatcong (Pm), Newark, at light (Ang), near New York, rare (Bt).
P. bimaculata Steph. Newark, on Petunias (Ang).
P. biloba Steph. Newark (Ang, Erb), in May (Wdt), Woodbury, VII, 7 (Kp).

- P. verruca* Fabr. Staten Island, X (Ds), Hemlock Falls, Newark, V, 15 (Sb), Greenville, not rare.
- P. rogationnis* Gn. = *dyaus* Grt. Near New York on wandering Jew, geranium and *Eupatorium*.
- P. precætionis* Gn. Throughout the State, V-X: double brooded and a general feeder on low weedy plants.
- P. ou* Gn. Newark, X, 7 (Kp).



Fig. 200.—The cabbage looper, *Plusia brassicæ*; *a*, larva; *b*, pupa in its flimsy cocoon; *c*, male moth.

- P. brassicæ* Riley. Throughout the State and all season: the larva a general feeder on cruciferous plants and seasonally injurious to cabbage. It is the cabbage looper, becoming most troublesome late in the season and resisting ordinary spraying mixtures quite strongly. Bran and paris green applied dry will usually prove effective.
- P. oxygramma* Gey. Newark, X, 7 (Kp), rare near New York (Bt).
- P. mortuorum* Gn. Newark, VII and VIII; "New Jersey."
- P. epigæa* Grt. Rare near New York (Bt).
- P. basigera* Wlk. = *laticlavata* Morr. Hopatcong (Pm), Newark, IX, 18, X, 6 (Sb).
- P. simplex* Gn. Throughout the State, V-XI: double-brooded, the larva on a great variety of cruciferous and other weedy low plants.

LEPIPOLYS Gn.

- L. perscripta* Gn. I have seen a New Jersey specimen, but do not remember exactly where it was taken.

CALPE Tr.

- C. canadensis* Beth. Ft. Lee (Dyar), "New Jersey": larva on meadow-rue — *Thalictrum*.

PLUSIODONTA Gn.

P. compressipalpis Gn. Staten Island, VIII (Ds), Newark, VII (Wdt), Elizabeth, IX, 6 (Kp): larva resembles bird excrement (Dyar), and is found on *Menispermum canadense*.

HYPsorOPHA Hbn.

H. hormos Hbn. Newark (Soc), Elizabeth, VIII, 1, Camden, VI, 6, VII, 26 (Kp), Anglesea, VIII, 21 (Lt).

CIRRHOphanus Grt.

C. triangulifer Grt. Caldwell (Cr), Newark (Soc), Philadelphia (Lt).

STIBADIUM Grt.

S. spumosum Grt. Has been recorded from New Jersey.

PLAGIOMIMICUS Grt.

P. pitychromus Grt. Newark (Wdt).

CHLORIDEA Westw.

C. virescens Fabr. Staten Island, VIII, IX (Ds).

HELIOTHIS Ochs.

H. armiger Hbn. Throughout the State and throughout the season. There are three broods and the larva is the tomato worm of early summer, boring into the fruit, and the corn worm of late summer and fall, boring into the ear. It also bores into pea pods and feeds on quite a variety of other plants. It winters as a pupa in corn-fields and the best method of reducing its numbers is to fall-plow these. Applying insecticides on the tomatoes is not practical.

DERRIMA Wlk.

D. henrietta Grt. "New Jersey," without date or exact locality.

ALARIA Westw. = RHODOPHORA Gn.

A. florida Gn. Throughout the State in July, in the closed flowers of *Enothera*, in the buds and seed capsules of which the larva feeds.

SCHINIA Hbn. = ANTHÆCIA Gn.

S. trifascia Gn. Caldwell (Cr), New Brunswick, and probably quite generally distributed.

S. nundina Dru. Hopatcong (Pm), Andover, VIII (Kr), Staten Island, VIII (Ds), Newark, VIII (Soc), Orange Mts. (Wdt), Anglesea, IX, 2 (Lv), Jamesburg, on flowers of *Spiræa*.

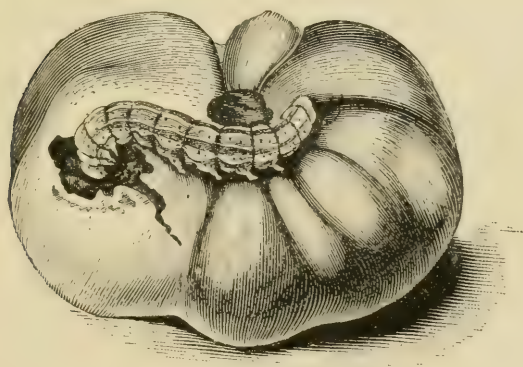
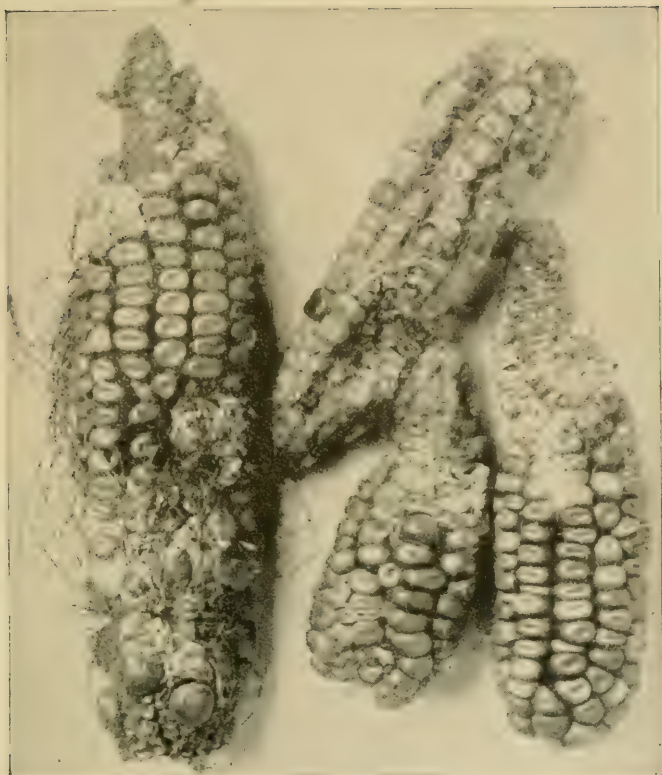


Fig. 201.—Work of the corn-worm in field corn.

Fig. 202.—Work of the corn-worm in tomato.

- S. lynx* Gn. Staten Island, VI (Ds), Atco, IX, 1 (Kp), Anglesea, VIII, 16 (Lt); probably occurs throughout the State, but is rarely taken.
- S. arcifera* Gn. Staten Island, VIII and IX (Ds), South Orange, VIII (Bwl), Orange Mts., VIII, 21, IX, 5 (Wdt), Elizabeth, IX, 7 (Kp), Anglesea, VIII, 21 (Lt), New Brunswick, VIII and IX.
- S. spinosæ* Gn. Sandy Hook (Bt), Atco, IX, 4 (Kp), Clementon, IX, 9 (Lt), Anglesea, IX, 20.
- S. thoreau* G. & R. Newark, VIII, 25 (Ang).
- S. marginata* Haw. = *rivulosa* Gn. Common throughout the State, VIII and IX, usually at light.
- S. brevis* Grt. Staten Island, IX (Ds), Newark (Erb), Orange Mts., IX (Wdt).
- S. inclara* Strck. Woodbury, VI, 18 (Kp).

ACONTIA Ochs. = TARACHE Hbn.

- A. erastroides* Gn. Newark, V and VI (Wdt), Staten Island, VI and VII (Ds), Elizabeth, VII, 24 (Kp), New Brunswick and probably throughout the State: larva on rag-weed and burdock.
- A. canefacta* Hbn. Throughout the State, V to VIII; our most common species: larva on rag-weed, burdock, etc.
- A. delecta* Wlk. Staten Island, VI (Ds), Cape May (Lt): the larva on swamp mallow *Hibiscus moschatus*.

CHAMYRIS Gn.

- C. cerintha* Tr. Throughout the State, VI and VII, sometimes common; larva on wild cherry, plum, apple and perhaps other orchard trees: not injurious.

XANTHOPTERA Gn.

- X. nigrofimbria* Gn. I have seen New Jersey specimens.
- X. semiflava* Gn. Southern New Jersey.

SPRAGUEIA Grt.

- S. onagrus* Gn. Common at light, locally, throughout the State.
- S. leo* Gn. Staten Island (Ds), Chester (Wdt), New Brunswick.

EXYRA Grt.

- E. semicrocea* Gn. Pleasantville, VI, 13 (Lt): larva in *Sarracenia*, Lah. away in May.

PROTHYMIA Hbn.

- P. rhodarialis* Wlk. = *coccineifascia* Grt. New Brunswick, Anglesea, and I have seen specimens from other parts of the State.
- P. semipurpurea* Wlk. = *rosalba* Grt. Elizabeth, VIII, 4, worn examples, IX, 1, fresh examples (Kp).

METATHORASA Moore.

M. monetifera Gn. Hopatcong (Bt), Orange Mts., VI (Wdt), Newark (Soc), Elizabeth, VII, 24, Glassboro, VII, 3 (Kp), Lahaway.

EUHERRICHIA Grt. = HERRICHIA Grt.

E. mollissima Gn. Jersey City at sugar, VIII, usually rare, common in 1898 (Kr), Anglesa, VII, 24 (Kp).

LITHACODIA Hbn.

L. bellicula Hbn. Woodbury, V, 5, Elizabeth, VII, 24 (Kp), Anglesea, V, VII, IX.

ERASTRIA Ochs. = EUSTROTIA Hbn.

E. albidula Gn. New Brunswick.

E. concinnimacula Gn. Caldwell (Cr), Staten Island, V (Ds).

E. synochitis G. and R. Newark (Erb), V, VI, VII (Wdt).

E. olivula Gn. Newark (Wdt), common near New York (Bt).

E. musta G. and R. Newark, at light, VIII (Wdt).

E. muscosa Gn. Staten Island, VI, VIII (Ds), Hopatcong (Pm), Caldwell (Cr), Forest Hill, VI, VII, VIII (Wdt), North Jersey (Sb).

E. caduca Grt. Jamesburg, VII, larva on *Sagittaria*.

E. apicosa Harv. Throughout the State, V-IX, common.

E. carneola Gn. Throughout the State, V-IX: the most abundant of the species.

E. æria Grt. Newark, VI (Wdt).

GALGULA Gn.

G. hepara Gn. and var. *partita* Gn. Throughout the State, VII-X, usually not rare.

METOPONIA Dup.

M. obtusa H. S. Caldwell (Cr).

DRASTERIA Hbn.

D. erechtea Cram. Throughout the State, V-X, common: larva on grass, clover, etc.

D. crassiuscula Harv. With the preceding but less common; larval habits as before: neither of the species, though very numerous, is at all injurious.

CÆNURGIA Wlk.

C. convalescens Gn. "New Jersey"; by no means common.

HYPOCALA Gn.

H. hillii Lint. Staten Island, IX, 26 (Ds).

EUCLIDIA Ochs.

E. cuspidata Hbn. Throughout the State, V-VIII, not rare locally.

SYNEDA Gn.

S. graphica Hbn. Staten Island, IV, V, VIII (Ds), Sandy Hook (Sb), Laha-way, V, 28 (Sm), Clementon, V, 10 (Ju) and 12 (Lt), locally common. The variety *media* Morr., occurred less abundantly than the type at Clementon (Lt).

MELIPOTIS Hbn.

M. limbolaris Geyer. Orange Mts., VII, 4 (Wdt).

M. jucunda Hbn. Hemlock Falls, VI, 1 (Sb).

MAGUSA Wlk.

M. divaricata Grt. Newark, VIII, 18, light (Ang).

CATOCALA Schrank = PARTHENOS and ALLOTRIA.

C. nubilis Hbn. Caldwell (Cr), Newark, V, at light (Wdt), VI (Sb), Camden, VI, 10 (Kp), Staten Island, VI, VII, VIII (Ds): larva on locust (Dyar).

C. elonympha Hbn. Staten Island, VI, VIII (Ds), Caldwell (Cr), Anglesea (Lt): larva on walnut.

C. amica Hbn. Newark (Wdt), IX, 26 (Sb).

var. *lineella* Grt. Caldwell (Cr): larva on oak.

C. gracillis Edw. Staten Island, VII, Newark, VIII (Sb), Elizabeth VIII, 4 (Kp), Anglesea (Lt).

The variety *sordida* Grt, also occurs, without doubt.

C. minuta Edw. Staten Island, VII, VIII (Ds), Elizabeth, VIII, 14 (Kp): larva on locust.

The variety *parvula* Edw., occurs with the type.

C. grynea Cram. Staten Island, VII, VIII (Ds), Caldwell (Cr), Newark, VII (Sb), Elizabeth, VII, 24 (Kp): larva on apple and plum.

C. praeclara G. & R. Caldwell (Cr), Elizabeth, VII, 29 (Kp).

C. micronympha Gn. Anglesea (Lt).

C. similis Edw. "New Jersey," without date or exact locality.

C. amasia S. & A. Roselle, Union County (Peck).

C. crataegi Saund. Rare near New York, larva on thorn (Bt).

The variety *pretiosa* Lint., has also been taken in the State.

C. blandula Hulst. = *polygama* Gn. Caldwell (Cr), larva on *Crataegus*.

C. consors S. and A. Da Costa, VII, 18 (Lt).

- C. cerogama* Gn. Staten Island, VIII (Ds), Newark, VIII (Wdt), Elizabeth VIII (Kp).
var. *bunkerii* Grt. Caldwell (Cr).
- C. ultronia* Hbn. Throughout the State, VII-X. The larva is recorded from apple, plum, wild cherry, dogwood, oak, &c. There are several varieties which I have not separated from the New Jersey material.
- C. coccinata* Grt. Has been recorded from New Jersey.
- C. ilia* Cram. Throughout the State, VII, VIII, IX, common: the larva on oak.
- C. marmorata* Edw. Not actually taken, but will probably occur.
- C. parta* Gn. Staten Island, VII to IX (Ds), Newark, VII, 8, 10 (Sb), and probably throughout the State. Larva on willow and poplar.
- C. unijuga* Wlk. Staten Island, VII, VIII (Ds), Newark, VIII, IX (Sb), Elizabeth, IX, 19 (Kp), Anglesea (Lt).
- C. briseis* Edw. "New Jersey," without definite locality.
- C. concumbens* Wlk. Throughout the State, VIII and IX, sometimes common: larva on willow and poplar.
- C. cara* Gn. Common throughout the State, VII, VIII, IX: larva on willow and poplar. The variety *carissima* Hulst, occurs more rarely.
- C. amatrix* Hbn. Also occurs throughout the State, VII-IX: larva on willow and poplar. The variety *nurus* Wlk., has been taken at Newark.
- C. relicta* Wlk. Irvington, VIII, 15 (Sb), on white birch and silver poplar.
var. *phrynica* Edw. Newark, VII, 25.
- C. tristis* Edw. Dover (Jn), Caldwell (Cr), Lahaway (Sm).
- C. epione* Dru. Staten Island, VII, VIII (Ds), Newark, VII, VIII (Wdt), Elizabeth, VII, 30 (Kp): larva on oak.
- C. antinympha* Hbn. Staten Island, VII, VIII (Ds). Newark, VIII and IX (Soc), Caldwell (Cr), Elizabeth, VIII, 14 (Kp).
- C. serena* Edw. Hopatcong (Pm), Caldwell (Cr): larva on hickory and walnut.
- C. badia* G. and R. Englewood (Bt), Newark (Sb), Elizabeth, VIII, 6 (Kp), Anglesea: larva on wax myrtle.
- C. muliercula* Gn. Staten Island, VIII (Ds), Newark, VIII (Bwl), Elizabeth, VIII, 6 (Kp), Da Costa, Anglesea, VII, VIII (Lt): larva on wax myrtle.
- C. habilis* Grt. Staten Island, VIII (Ds), Elizabeth, IX, 1 (Kp), Orange VIII, 2, IX, 26 (Sb): larva on hickory.
var. *basilis* Grt. With the type, but rarely.
- C. innubens* Gn. Staten Island, VII, VIII (Ds), Elizabeth, VIII, 12 (Kp): larva on walnut.
- C. paleogama* Gn. Staten Island, VII, VIII (Ds), Caldwell (Cr), Newark, VIII, IX (Sb): larva on walnut and hickory. The variety *phalanga* Grt. is less common than the type.
- C. neogama* S. and A. Staten Island, VII, VIII (Ds), Newark, larva, VII, 4, under stones at foot of butternut trees, adults, VII, 29, VIII, 2, IX, 8 (Sb), Caldwell (Cr): larva also on walnut.

- C. subnata* Grt. Caldwell (Cr) : larva on walnut and hickory.
- C. piatrix* Grt. Caldwell (Cr), Newark, VIII, IX (Sb), Elizabeth, VIII, 14 (Kp) : larva on walnut, hickory, persimmon.
- C. nebulosa* Edw. Should occur in New Jersey.
- C. robinsonii* Grt. Orange Mts., IX, 3, 26 (Sb), Newark, IX, 5 (Soc), Caldwell (Cr) : larva on hickory.
- C. dejecta* Strck. Newark (Ang).
- C. resecta* Grt. Staten Island, VIII (Ds), Newark, IX, 5 (Soc), Caldwell (Cr) : larva on hickory. The variety *flexibilis* Grt., occurs with the type.
- C. vidua* S. and A. = *desperata* Gn. Hopatcong (Pm), Caldwell (Cr), Staten Island, IX (Ds) : larva on oak, hickory and walnut.
- C. maestosa* Hulst. = *viduata* Gn. Orange Mts., IX, 3, 26 (Sb), Elizabeth, VIII, 27 (Kp), Pleasantville (Lt) : larva on walnut.
- C. lacrymosa* Gn. Newark, IX, 26 (Sb).
var. *ulalume* Strck. Morristown (Peck).
- C. agrippina* Strck. Rare near New York (Bt).
- C. insolabilis* Gn. Caldwell (Cr) : larva on hickory.
- C. angusi* Grt. "New Jersey" : larva on hickory.
- C. obscura* Strck. Caldwell (Cr), Staten Island, VII, VIII (Ds).
var. *residua* Grt. In addition to above, Hopatcong (Pm), Orange Mts., larva in June (Wdt), Elizabeth, VIII, 10 (Kp) : feeds on hickory.

HOMOPHOBERIA Morr.

- H. cristata* Morr. "Hoboken" (Morrison).

PHOBERIA Hbn.

- P. atomaris* Hbn. Newark (Soc), in April (Bwl).

CELIPTERA Gn.

- C. frustulum* Gn. Throughout the State, VII and VIII, sometimes not rare.

FAGITANA Wlk. = PSEUDOLIMACODES Grt.

- F. littera* Wlk. Hopatcong (Pm), Jersey City, VII, at sugar (Kr), Newark (Soc).

PHURYS Gn.

- P. lima* Gn. I have seen a New Jersey specimen.

POAPHILA Gn.

- P. quadrifilaris* Hbn. Staten Island V (Ds), Orange Mts., V, VI (Wdt), So. Orange, VI (Bwl), Newark.
- P. deleta* Gn. Staten Island, VIII (Ds).

PARALLELIA Hbn.

P. bistriaris Hbn. Staten Island, VIII, IX (Ds), Caldwell (Cr), Newark, V, VI, larva on maple (Sb), VIII (Wdt), Elizabeth, VIII, 1 (Kp).

AGNOMONIA Hbn.

A. anilis Dru. Newark (Soc).

PANOPODA Gn.

P. rufimargo Hbn. Throughout the State, VI, VII and VIII: the *var. carneicosta* Gn., and *roseicosta* Gn., with the type and equally abundant. Larva on upper side of oak leaf (Dyar), and feeds also on hickory and willow.

PLEONECTYPTERA Grt.

P. pyralis Hbn. New Brunswick.

P. geometralis Grt. Staten Island, VII (Ds).

REMIGIA Gn.

R. latipes Gn. Staten Island, VIII to X (Ds), Newark, IX (Bwl), Elizabeth, VIII, 19 (Kp), Orange Mts., VIII (Wdt).

EREBUS Latr.

E. odora Linn. Staten Island, VII and IX (Ds): occasionally taken along the coast in cities and is a wind visitor.

ZALE Hbn.

Z. horrida Hbn. Throughout the State, VI, VII, VIII, sometimes quite abundant.

PHÆOCYMA Hbn.

P. lunifera Hbn. "New Jersey."

HOMOPTERA Bdv.

H. lunata Dru. Throughout the State, VII to X; the *var. edusa* Dru., with the type and equally common: larva on maple, willow, rose, etc.

H. nigricans Beth. Occasional throughout the northern part of the State.

H. calycanthata S. and A. Elizabeth, VIII, 27 (Kp).

H. penna Morr. Near New York, not common (Bt).

H. unilineata Grt. Staten Island, V (Ds), Newark, VI (Bwl).

H. obliqua Gn. Staten Island, VI, VII, VIII (Ds).

YPSIA Gn.

Y. undularis Dru. Staten Island, V, VII, VIII (Ds) and probably throughout the State, with its varieties *æruginosa* Gn., and *umbripennis* Gn.

PSEUDANTHRACIA Grt.

P. coracias Gn. Elizabeth, VII, at sugar (Wdt).

HOMOPYRALIS Grt.

H. discalis Grt. Newark (Wdt), Camden, VI, 6, VIII, 5 (Kp), Anglesea (Lt).

H. contracta Wlk. = *tactus* Grt. Staten Island, VI to VIII (Ds), Caldwell (Cr), Elizabeth, VIII, 4, 22 (Kp).

H. tantillus Grt. Near New York, not common (Bt).

EUTOREUMA Grt.

E. tenuis Grt. Montclair VIII, 11 (Kearfott).

HYAMIA Wlk. = SPARGALOMA Grt.

H. perditalis Wlk. = *umbrifascia* Grt. Staten Island, VII (Ds), Elizabeth, VII (Wdt), VIII, 4 (Kp), Anglesea, VII, 21 (Lt).

H. sexpunctata Grt. Near New York (Bt), Newark (Sb).

PANGRAPTA Hbn.

P. decoralis Hbn. Throughout the State V-VIII, locally common.

PHALÆNOSTOLA Grt.

P. larentioides Grt. Newark, VIII (Bwl), Westville, VI, 6 (Jn), Anglesea, VI, 15 (Lt).

Family HYPENIDÆ.

These are the "snout moths," so called because in many of them the palpi are projected straight forward into a beak, though sometimes they are curved sickle-shaped over the head. They are also known as Deltoids because many of them, when at rest, have an outline like the Greek letter Δ *delta*. They are all obscurely colored moths of small or moderate size, living in wood or among grasses. The larvæ vary, some of them lacking one pair of abdominal legs: they live in many cases on dead leaves or decaying wood, but also eat grasses or other vegetation. None of them are economically important in New Jersey.

It may be added that in this family sexual modification has run wild, antennæ, feet, palpi and wings being modified in the species. The antennæ have knots,

spurs or tufts as well as the normal pectinations. The fore-legs have a varied assortment of hair pencils, and these slop over on the palpi of others, while in one case the wing of the male is deeply notched, while in the female it is entire. We are as yet at a loss to explain why these structures should be needed by these insects.

Sub-family **HELIINÆ.**

EPIZEUXIS Hbn.

- E. lubricalis* Geyer. Staten Island, VII-IX (Ds), Jersey City, VIII (Kr), Jersey City Hts., VI, 7 (Sb), at sugar, Boonton, VIII, (Bwl, Kp), Caldwell (Cr), New Brunswick, g. d. and not rare. The larva on grasses (Bt), and in decayed wood (Dyar).
- E. denticulalis* Harvey. Not actually recorded from New Jersey; but occurs from New York to Texas, and is almost certain to be found.
- E. rotundalis* Wlk. Forest Hill, VII (Wdt)
- E. scobialis* Grote. Near Newark and eastern N. J. generally.
- E. americalis* Gn. Local throughout the State, VII-IX, Lake Hopatcong (Pm), Ft. Lee District (Bt), Caldwell (Cr), Newark, VII and VIII (Wdt), New Brunswick. This species was bred from larvæ found in ants' nests by Dr. C. V. Riley. Mr. Beutenmuller gives *Hedysarum*, sweet-clover, &c., as food-plants.
- E. æmula* Hbn. Hopatcong (Pm), Staten Island, VII-IX (Ds), Caldwell (Cr), Newark, VII, VIII, IX (Wdt), New Brunswick and generally distributed, locally common. The larva is said to feed on spruce, and also on dead leaves.

Sub family **HERMINIINÆ.**

ZANCLOGNATHA Lederer.

- Z. lituralis* Hbn. (*Megachyta*) Orange Mts., VII (Wdt), New Brunswick, VII, rare at light.
- Z. theralis* Wlk. Occurs from Nova Scotia to North Carolina, and recorded by Beutenmuller from near New York City. No New Jersey specimens have been seen by me; but the species is sure to occur.
- Z. lævigata* Grote. Del. Water Gap, VII, 1 (Ju), northern N. J. generally.
- Z. pedipilalis* Gn. New Jersey lies well within the range of this species, though it has not been actually taken in the State, so far as I am aware.
- Z. cruralis* Gn. Staten Island, VIII (Ds), Newark, VIII (Bwl), Orange Mts., VI, Boonton, VIII, IX (Wdt), Elizabeth, VIII, 19 (Kp), common near New York City (Bt).
- Z. obscuripennis* Grote. I have seen specimens marked "N. J."
- Z. protummosalis* Wlk. New Brunswick, and probably occurs throughout the State.
- Z. marcidilinea* Grote. Newark, at light, VIII (Wdt), Merchantville, VI, 29 (Kp), Greenwood Lake.
- Z. ochreipennis* Grt. South Orange, VIII (Bwl), Newark, VIII, IX (Wdt), Elizabeth, VIII, 19 (Kp), and g. d.

HORMISA Wlk.

- H. absorptalis* Wlk. = *Litognatha nubilifascia* Grt. Montclair, New Brunswick, VII, at light (Sm), Elizabeth, VII, 24 (Kp), Newark, VII (Wdt), Westville, Anglesea (Lt).
- H. litophora* Grt. Staten Island, VII (Ds), Elizabeth, VII, 24 (Kp), Forest Hill, VII (Wdt).
- H. orciferalis* Wlk. Anglesea, at light, and recorded also from Philadelphia; but is decidedly rare.

PHILOMETRA Grote.

- P. metonalis* Wlk. Staten Island, VI (Ds).
- P. eumelusalis* Wlk. Jersey City, IX (Sb), near New York, the larva feeding on the roots of grasses (Bt).

CHYTOLITA Grote.

- C. morbidalis* Gn. Staten Island, V to VII (Ds), Newark, V-VIII (Soc), Orange Mts., VI (Wdt), and occurs throughout the State in deciduous woods.
- C. petrealis* Grt. Found with the preceding; but decidedly less common.

BLEPTINA Gn.

- B. caradrinalis* Gn. Hopatcong (Pm), Staten Island, VI, VIII and IX (Ds), Jersey City, VI (Kr), Elizabeth, VIII, 6 (Kp), Newark, V, VI, VII (Wdt), Westville, VII, 2 (Lt), generally distributed (Sm).
- B. inferior* Grt. Anglesea, IX, 12: a southern species.

TETANOLITA Grote.

- T. mynesalis* Wlk. Anglesea, not uncommon at light, VI and IX.
- T. floridana* Sm. Orange Mts., VIII, 16 (Kp). There is no doubt of the species and there seems no chance for a doubt as to the correctness of the locality.

RENIA Gn.

- R. salusalis* Wlk. = *brevirostralis* Grt. Westville, VII, 2 (Lt), Elizabeth, IX, 1 (Kp).
- R. discoloralis* Gn. Staten Island, VII and VIII (Ds), Newark, VIII (Bl), Orange Mts., VII, VIII (Wdt).
- R. sobrialis* Wlk. I have had specimens from New Jersey collections for determination; but have preserved no data.
- R. larvalis* Grote. Elizabeth, IX, 9 (Kp), Forest Hill, VII (Wdt), Staten Island, VII (Ds), common near New York (Bt).
- R. clitosalis* Wlk. Elizabeth, IX, 9 (Kp), Forest Hill, VII (Wdt).

R. factiosalis Wlk. "N. J.," Jamesburg, VII.

R. flavipunctalis Geyer. New Jersey, VII and VIII, and quite generally distributed in my experience. Newark, VII, VIII (Wdt), Anglesea, VIII, 14 (Lt).

R. fraternalis Sm. Newark (Buchholz) : an unexpected occurrence.

HYPENULA Grt.

H. cacuminalis Wlk. = *opacalis* Grt. A single specimen from Cumberland County.

HETEROGRAMMA Gn.

H. pyramusalis Wlk. = *Phalænophana rurigena*. Staten Island, VII and VIII (Ds), Elizabeth, VIII, 4 (Kp), Jersey City, IX (Sb) ; quite generally distributed in my experience.

GABERASA Wlk.

G. ambigualis Wlk. Staten Island, VIII (Ds), Newark, IV (Wdt), V (Bwl), Elizabeth, VIII, 22 (Kp).

DERCETIS Grt.

D. vitrea Grote. Sure to occur in New Jersey ; but has not yet been actually taken so far as I know.

PALTHIS Hbn.

P. angualis Hbn. Staten Island, V-IX (Ds), Andover, VI (Kr), Caldwell (Cr) ; throughout the State

P. asopialis Gn. Newark, VI and VIII (Wdt), X, 10 (Kp). Occurs with the preceding ; but is more rare.

Sub-family HYPENINÆ.

CAPIS Grt.

C. curvata Grt. I have seen specimens taken in New Jersey.

SALIA Hbn.

S. interpuncta Grt. Hopatcong (Pm).

BOMOLOCHA Hbn. = HYPENA in part.

B. manalis Wlk. Hopatcong (Pm), Newark (Sb), "New Jersey."

B. baltimoralis Gn. Staten Island, VI and VII (Ds), Newark, VI (Bwl), VII, VIII (Wdt), Elizabeth, VII, 20, IX, 5 (Kp), Caldwell (Cr), New Brunswick, V. The larva is said to feed on maple.

B. bijugalis Wlk. Anglesea, I, 18 (Lt), g. d., but nowhere common.

- B. scutellaris* Grote. Hopatcong (Pm), Newark at light, VIII (Wdt).
B. abalinealis Wlk. Staten Island, V (Ds), larva on elm (Dyar).
B. deceptalis Wlk. Not common near New York (Bt).
B. madefactalis Gn. Hopatcong (Pm), not common near New York (Bt).
B. sordidula Grt. Forest Hill, VII, rare (Wdt).
B. toreuta Grote. New Brunswick at light, VII.
B. edictalis Wlk. Hopatcong (Pm).
B. citata Grote. Newark, light, X (Wdt, Kp), New Brunswick, VII.

LOMANALTES Grote.

- L. eductalis* Wlk. Bloomfield, VIII, 14 (Kp): occasional in other parts of the State.

PLATHYPENA Grote.

- P. scabra* Fabr. Occurs everywhere from May to November. Mr. Broadwell records a specimen under bark at Boonton, Dec. 24. The larva feeds chiefly on clover.

HYPENA Schrank.

- H. humuli* Harr. Quite generally distributed and recorded as common at Caldwell by Mr. Crane. The larva feeds on hop and where that is cultivated it is sometimes rather plentiful.

It is more than likely that all the species that are distributed throughout the Eastern United States will also occur in New Jersey; but the moths are not favorites with collectors, are difficult to secure in good specimens and hence not so well represented as are some other families.

Family NYCTEOLIDÆ.

Obscurely marked gray species, in habitus like some of the "bell moths" or Tortricids. It has the main structural characters of the Lithosiids, but differs in venation.

NYCTEOLA Hbn.

- N. revayana* Scop. Newark in July (Soc): larva on willow. The species is not at all rare, but from its appearance is usually mistaken for a Tortricid.

Family DREPANIDÆ.

Moderate-sized, slender, broad-winged species, the forewings falcate, whence they have been called hook-tips. The larvæ have the anal pro-legs rudimentary and the terminal segment prolonged into a tail-like process.

EUDEILINEA Pack.

E. herminiata Gn. Staten Island, V and VI (Ds) : larva on bush Dogwood (Dyar).

ORETA Wlk. = DRYOPTERIS Grt.

O. rosea Wlk. Hopatcong (Bt, Pm), Staten Island, VI and VIII (Ds), Newark (Soc), Eagle Rock, VIII (Wdt) ; g. d. though not common ; the larva on *Viburnum* sp.

PLATYPTERYX Lasp.

P. arcuata Wlk. Newark (Ang), VIII, 9 (Sb), not rare, Orange Mts., V (Wdt), Staten Island, VIII, IX (Ds), New Jersey (Lt), Hopatcong (Pm) : the larva feeds in a tent, solitary, on birch and alder. The first brood is in June, the second is the form *genicula* ; some well-marked examples closely approach the Californian race *siculifer*.

FALCARIA Haw. = PRIONIA Hbn.

F. bilineata Pack. Hopatcong (Bt), Staten Island, VI, VIII (Ds) : the larva on birch.

Super-family GEOMETROIDEA.

These are small or medium-sized moths with slender bodies, small heads and very broad wings which are also, as a rule, frail and thin. The hind wings are quite usually ornamented as are the fore wings, the lines often continuous on both. Many species when at rest keep the wings extended and flat, much as specimens are pinned in the cabinet.

The larvæ are known as "span worms," "measuring worms" or "inch worms" because of their peculiar method of progression. The abdominal legs are in whole or in part obsolete and the caterpillar when in motion first extends the body full length, then humps itself in the middle and brings the anal segments up to the thoracic feet. When the body is again extended the insect has progressed nearly its own length. These caterpillars often so closely resemble the twigs among which they move that they are with difficulty seen, and some have the habit of stretching out full length so as to appear like a little spur or twig. Some species are injurious on cultivated plants but all are within reach of the arsenites.

The family and sub-family divisions are based upon characters not readily recognized except by the specialist, and no attempt is made to define them.

The recent revision by Dr. Geo. D. Hulst has been closely followed in the arrangement ; but as this differs greatly from that used in the first edition, an attempt has been made to give some of the synonymy as a guide. It should be remembered that it is not intended to do more than to guide merely, and the = sign must not be strictly interpreted.

Family GEOMETRIDÆ.

Sub-family DYSTERIDINÆ.

DYSPTERIS Hbn.

D. abortivaria H. S. Staten Island, V (Ds), Caldwell (Cr), Orange Mts., VIII (Wdt), Newark : larva on grape.

NYCTOBIA Hulst.

N. limitata Wlk. Staten Island, IV (Ds), rare near New York (Bt), Newark, New Brunswick : food plant *Amelanchier*, Juneberry.

N. fusifasciata Wlk. = *anguilineata* Grt. Should occur in New Jersey.

CLADARA Hulst. = LOBOPHORA.

C. atroliturata Wlk. Should occur in New Jersey ; rare near New York (Bt).

OPHEROPTERA Hbn.

O. boreata Hbn. Should occur in our State : larva on apple, pear, maple, elm.

Sub-family HYDRIOMENINÆ.

PALEACRITA Riley = ANISOPTERYX.



Fig. 204.

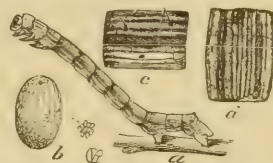


Fig. 203.

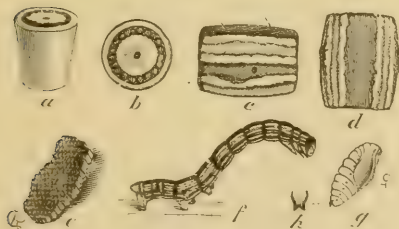


Fig. 205.



Fig. 206.

Fig. 203.—Spring canker-worm ; *a*, larva ; *b*, egg, very much enlarged ; *c*, *d*, body segment of larva.

Fig. 204.—Spring canker-worm, *Paleacrita vernata* ; *a*, male ; *b*, wingless female ; *c*, *d*, structural details.

Fig. 205.—Fall canker-worm : *a*, *b*, egg, enlarged from side and above ; *c*, *d*, body segments of larva, enlarged ; *e*, egg mass ; *f*, larva ; *g*, pupa ; *h*, its tip, enlarged.

Fig. 206.—Fall canker-worm, *Alsophila pometaria* ; *a*, male ; *b*, wingless female ; *c*, *d*, *e*, details, enlarged.

- P. vernata* Harr. The larva is the Spring canker-worm, an injurious species locally throughout the State. Moths in April or May, larvæ most destructive in June. It rarely causes any notable loss with us, but has been troublesome near Mount Holly. Thorough spraying with the arsenites when the insects are first seen will prove effective.

ALSOPHILA Hbn.

- A. pometaria* Peck. = *autumnata* Pack. Staten Island, XI and XII (Ds), and rarely throughout the State.

EUDULE Hbn. = EUPHANESSA.

- E. mendica* Wlk. Throughout the State, VI and VII, more or less local and sometimes common.
- E. meridiana* Slosson. Newark, at light (Ang), Central Park, New York (Bt). These species were, until recently, classed among the Lithosiids.

PHILOPSIA Hulst.

- P. nivigerata* Wlk. Rare near New York (Bt).

NANNIA Hulst.

- H. refusata* Wlk. = *harveiana* Pack. Should occur in New Jersey.

HETEROPHLEPS H. S.

- H. triguttaria* H. S. Staten Island, VI, VIII (Ds), Forest Hill, VII (Wdt), and more or less common throughout the State. Larva on maple.

TEPHROCLYSTIS Hbn. = EUPITHECIA Curt.

- T. nebulosa* Hulst. Recorded from New Jersey by Hulst.
- T. implicata* Wlk. Newark, VII (Bwl).
- T. miserulata* Grt. A common species throughout the State; recorded from March to October inclusive. Larva on *Taxus*, Juniper and Tamarack.
- T. interruptofasciata* Pack. Should occur in New Jersey.
- T. absynthiata* Linn. Newark, VI (Wdt): larva on *Solidago*, *Senecio* and *Artemisia*.

EUCYMATOGE Hbn. = PHIBALAPTERYX Steph.

- E. intestinata* Gn. Hopatcong (Pm), Newark, light, VIII (Wdt).

VENUSIA Curt. = EPIRRITA Hbn.

- V. cambrica* Curt. Should occur in New Jersey, Philadelphia.
- V. duodecimlineata* Pack. Staten Island, V (Ds).
- V. comptaria* Wlk. Near New York, on beech and alder.

EUCHÆCA Hbn. = BAPTRIA Hbn.

- E. albovittata* Gn. Hopatcong (Pm) and throughout the hilly north.
E. lucata Gn. Hopatcong (Pm).
E. albogilvaria Morr. "New Jersey": food-plant elm.

ASTHENA Hbn. = EPIRRITA Hbn.

- A. dilutata* Bork. Should occur in New Jersey.

CALOCALPA Hbn. = HYDRIA Hbn.

- C. undulata* Linn. Orange Mts., VIII (Wdt). Larva gregarious in webbed-up leaves of wild cherry (Dyar).

EUSTROMA Hbn. = PETROPHORA Hbn.

- E. diversilineatum* Hbn. Newark, VII, VIII (Wdt), Caldwell (Cr), Anglesea, IX, 9 (Sm), Staten Island, VII, VIII (Ds), New Brunswick, IX, 17: larva on grape and *Ampelopsis*.
E. testatum Linn. Del. Water Gap, VII, 14 (Jn): larva on birch, willow and bean.
E. prunatum Linn. Should occur in the State.
E. atrocoloratum Grt. Delaware Water Gap, VII, 14 (Jn).

PLEMYRIA Hbn. = RHEUMAPTERA Hbn.

- P. hastata* L. Hopatcong (Pm), Staten Island, VI, VII (Ds), Newark: larva on birch and wax myrtle.

ZENOPHLEPS Hulst.

- Z. lignicolorata* Pack. Rare near New York (Bt).

PERCNOPTILOTA Hulst. = PLEMRIA Hbn.

- P. fluviata* Hbn. Common, May to November, throughout the State. Larva on elm, smartweed, *Senecia*.

MESOLEUCA Hbn. = RHEUMAPTERA Hbn.

- M. ruficiliata* Gn. Hopatcong (Pm), New York (Bt): larva on birch.
M. cæsiata Bork. Hopatcong (Pm).
M. lacustrata Gn. Staten Island, VI, VII, VIII (Ds), Hopatcong (Pm), Newark, Woodside, III, VIII (Wdt): larva on blackberry.
M. truncata Hbn. Common near New York: larva on strawberry (Bt).
M. hersiliata Gn. Near New York, not common (Bt).
M. vasaliata Gn. Newark, IV (Bwl), Forest Hill, III, common on hemlock (Wdt): said to feed on wild rose.
M. intermediata Gn. On elm near New York (Bt), Newark, VIII.

HYDRIOMENA Hbn.

- H. trifasciata* Bork. Newark, VIII (Aug).
H. latirupta Wlk. Throughout the State, VI-IX: larva on *Polygonum*.
H. multiferata Wlk. Staten Island, VI (Ds): larva on *Polygonum*.
H. unangulata Harv. Newark, VIII (Wdt), near New York, larva on chick weed (Bt).

TRIPHOSA Steph.

- T. dubitata* Linn. Should certainly be found in our State.

CÆNOCALPA Hbn.

- C. magnoliata* Gn. = *cumatilis* G. and R. Taken in Pennsylvania and should occur in the hilly north of New Jersey.
C. gibbicostata Wlk. = *strigularia* Minot. "New Jersey."

GYPSOCHROA Hbn.

- G. designata* Bork. Hopatcong (Pm), Newark; larva on *Cruciferae*, wild and cultivated (Bt).

XANTHORHOË Hbn. = OCHYRIA.

- X. munitata* Hbn. Should occur in New Jersey.
X. ferrugata Hbn. Orange Mts., VIII (Wdt): larva on *Polygonum*, and *Nepeta hederacea*.
X. fluctuata Linn. Boonton, VIII (Wdt), Staten Island (Ds); larva on cabbage.

Sub-family MONOCTENINÆ.

HÆMATOPSIS Hbn.

- H. grataria* Fabr. Common throughout the State, May to October, much more abundant in fall. Larva on *Polygonum* and *Stellaria media*.

Sub-family STERRHINÆ.

CALOTHYSANIS Hbn.

- C. amaturaria* Wlk. Newark, VIII (Soc), Forest Hill (Wdt), Caldwell (Cr), Camden, IX, 14 (Kp), Staten Island, VIII (Ds).

DEPTALIA Hulst. = ACIDALIA.

- D. insularia* Gn. Throughout the State, VI-X, common: larva on *Clastrus scandens*, *Galium* and *Cassia*.

LEUCOPHTHALMIA Hbn. = EPHYRA.

- L. myrtaria* Gn. Anglesea (Lt). Larva on sweet fern and huckleberry.
L. lumenaria Hbn. = *pendulinea* Gn. Staten Island, V, VII, VIII (Ds), Newark, V (Sb), VI, VII, VIII (Wdt), Jamesburg, VIII, 10: larva on sweet-fern.
L. pannaria Gn. Clementon, V, 10 (Kp).

SENELYS Hulst = ACIDALIA.

- S. enucleata* Gn. Throughout the State, common, VI, VII, VIII: larva on huckleberry, *Rhexia lutea* and *Galium*.

CINGLIS Gn.

- C. quadrilineata* Pack. Hopatcong (Pm), rare near New York (Bt).
C. purata Gn. = *cacuminata* Morr. "New Jersey."

EOIS Hbn. = ACIDALIA.

- E. peralbata* Pack. Anglesea, common (Lt).
E. ossularia Hbn. Anglesea, VII, 11 (Kp), VIII, 23 (Lt), V, 30, VII, 9, IX, 3 (Sm), Jamesburg, VIII, 10, Riverton, V, 30, New Brunswick, IX, 18.
E. granitata Pack. "New Jersey."
E. obfustaria Wlk. = *punctofimbriata* Pack. Caldwell (Cr).
E. inductata Gn. Staten Island, VII, VIII (Ds), Boonton, VIII, Newark, VI (Wdt), Anglesea (Lt).

Sub-family STROPHIDIINÆ.

CALLEDAPTERYX Grt.

- C. dryopterata* Grt. Orange Mts., VI (Wdt).

Sub-family GEOMETRINÆ.

CHLOROCHLAMYS Hulst. = EUCROSTIS.

- C. chloroleucaria* Gn. Hopatcong (Pm), Caldwell (Cr), Newark, V (Wdt), Elizabeth, VII, 20 (Kp), Anglesea (Lt), VI, VII, 9 (Sm), New Brunswick, VII: on flowers of black and raspberry and *Helenium autumnale*.

NEMORIA Hbn.

- N. pistaciata* Gn. Caldwell (Cr), Staten Island, VI, VII (Ds).
N. subcroceata Wlk. Caldwell (Cr), Newark, VI, VII (Soc), Elizabeth, IX, 5 (Kp), Jamesburg, VII, 4 (Lt), Lahaway VI.

EUCROSTIS Hbn.

E. incertata Wlk. = *gratata* Pack. Jamesburg, VII, 4 (Lt), Lahaway, VI.

RACHEOSPILA Gn.

R. lixaria Gn. = *Aplodes rubrolinearia* Pack. = *inclusaria* Wlk. Lake Hopatcong (Pm) : feeds on *Myrica*.

SYNCHLORA Gn.

S. glaucaria Gn. Staten Island, VI, VII, VIII (Ds), Westville, VII, 20 (Lt).

S. rubifrontaria Pack. Newark, V, VI, VII (Wdt), Staten Island, VII (Ds).

APLODES Gn.

A. mimosaria Gn. Staten Island, V, VI (Ds), Newark, V, IX (Soc), Caldwell (Cr).

A. bistriaria Hbn. = *brunnearia* Pack. Should occur in New Jersey.

A. ærata Fabr. = *rubivora* Riley. Hopatcong (Pm), Newark, Anglesea, VII, 9, VIII, 2 : larva on black and raspberry.

ANAPLODES Pack.

A. remotaria Wlk. = *Geometra iridaria* Auct.

A. iridaria Gn. Staten Island (Ds), Newark, and occasional throughout the State.

A. rubromarginata Pack. Newark : larva on wax myrtle.

Sub-family **BREPHINÆ**.**BREPHOS** Hbn.

B. infans Moeschl. Staten Island, III, IV (Ds).

Family ENNOMIDÆ.Sub-family **ENNOMINÆ**.**EPELIS** Hulst.

E. truncataria Wlk. Clementon, V, 9 (Lt).

EUFIDONIA Pack.

E. notataria Wlk. "New Jersey" : food plants, Tamarack, hemlock, pine.

ORTHOFIDONIA Pack. = CORYCIA.

- O. semiclarata* Wlk. New Jersey, probably.
O. vestaliata Gn. Staten Island, VIII (Ds), Caldwell (Cr), Newark (Sb),
 Ocean Co., VI: larva on apple, hornbeam, oak.

HELIOMATA Grt.

- H. infulata* Grt. Rare near New York (Bt).
H. cycladata Grt. Orange Mts., VI, rare (Wdt).

PHYSOSTEGANIA Warr. = STEGANIA.

- P. pustularia* Gn. Hopatcong (Pm), Caldwell (Cr), Staten Island, V-VIII
 (Ds), Newark (Soc): larva on maple.

GUENERIA Pack.

- G. basiararia* Wlk. Newark, VI (Bwl), Elizabeth, VII, 20 (Kp).

DEILINEA Hbn.

- D. variolaria* Gn. Hopatcong (Pm), Bloomfield, VI (Bwl), Newark, VI
 (Wdt): larva on willow.
D. erythremaria Gn. Hopatcong (Pm), Orange Mts., VI (Wdt), Elizabeth,
 VIII, 16 (Kp).
D. exanthemata Scop. Newark, V, 19 (Wdt).
D. liberaria Wlk. Newark, VIII and IX (Soc), Staten Island, IX (Ds).
D. nigroseriata Pack. Newark, VIII (Wdt).

SCIAGRAPHIA Hulst. = SEMIOTHISA.

- S. granitata* Gn. Forest Hill, V, VIII (Wdt), Camden, IV, 25 (Kp).
S. muscariata Gn. New Brunswick.
S. heliothidata Gn. = *ocellinata* Gn. Staten Island, VIII (Ds): larva on
 Locust.
S. nubiculata Pack. Rare near New York (Bt).
S. neptata Gn. Newark (Bwl).
S. continuata Pack. = *orillata* Wlk. Orange Mts., VIII, rare (Wdt), An-
 glesea, VI, IX, 4.
S. mellistrigata Grt. Anglesea (Lt), Newark (Ang).
S. subminiata Pack. Newark, VIII (Wdt).

PHILOBIA Dup.

- P. enotata* Gn. Staten Island, V, VI, VIII (Ds), Orange Mts., VI, 8 (Wdt),
 Jamesburg, VII, 4 (Lt), Clementon, V, 10 (Kp): larva on *Lactuca*
grandiflora.

MACARIA Curt.

- M. infimata* Gn. Forest Hill (Kp), Newark (Soc).
M. eremiata Gn. Clementon, V, 10 (Lt), Lahaway, VI, 10.
M. æquiferaria Wlk. Rare near New York (Bt).
M. minorata Pack. Should be found in New Jersey.
M. præatomata Harv. Newark, VII (Bwl), Forest Hill, VIII (Wdt), Camden, IV, 25 (Kp); larva on huckleberry.

DIASTICTIS Hbn.

- D. ribearia* Fitch. Hopatcong (Pm), Caldwell (Cr), Newark (Soc), and probably throughout the State. The larva is the currant and gooseberry span worm and sometimes locally injurious: it is easily controlled by arsenical sprays.
D. sulphuraria Pack. Should occur in New Jersey.
D. flavicaria Pack. Newark, VIII.
D. inceptata Wlk. = *argillacearea* Pack. Newark, VI, IX (Wdt).
D. subcessaria Wlk. Orange Mts., VI (Wdt), also a currant span worm; but never found in harmful numbers.
D. wavaria Linn. Staten Island, VI (Ds): larva on currant and gooseberry.
D. subalbaria Hulst. Orange Mts., VI (Wdt).
D. umbrifasciata Hulst. Newark, New Brunswick.
D. inquinaria Hulst. Newark, VII, 16 (Wdt).

HOMOCHLODES Hulst.

- H. fritillaria* Gn. Bloomfield, VI and VII (Wdt).

APÆCASIA Hulst. = LOZOGRAMMA.

- A. deterrenta* Gn. Newark, V, VI, VII (Soc), Staten Island, VI, VII (Ds).
A. defluata Wlk. Newark, V (Wdt), Woodbury, IX, 5 (Kp), Staten Island, V (Ds), Lahaway, VI: larva on grass.

CATOPYRRHA Hbn. = ASPILATES.

- C. colocaria* Fabr. Throughout the State, IV to VII; larva on black and raspberry, and *Trifolium*. The varieties *dissimilaria* Hbn., and *sphæromacaria* Harv., have also been taken.

CARIPETA Wlk.

- C. divisata* Wlk. Caldwell (Cr).
C. angustiorata Wlk. Should occur in the State.

NEPYTIA Hulst.

- N. semiclusaria* Wlk. "New Jersey" larva on fir, pine, spruce, tamarack.

ALCIS Curt.

- A. multilineata* Pack. Rare near New York (Bt).
A. atrolinaria Hulst. Newark, IV, at light (Wdt).

AMILAPIS Gn. = PARAPHIA.

- A. unipunctata* Haw. Orange Mts., VIII, 16 (Kp).
A. subatomaria Gn. Caldwell (Cr), Newark, light, VI (Wdt); larva on pine, spruce and other evergreens.

PARAPHIA Gn.

- P. deplanaria* Gn. Staten Island, VIII (Ds): larva on beech, alder, basswood, pine, spruce, fir, etc.

STENOTRACHELYS Hbn.

- S. approximaria* Hbn. Lake Hopatcong (Pm).

LYTROSIS Hulst = HEMEROPHILA.

- L. unitaria* H. S. Newark (Soc), Caldwell (Cr).

TORNOS Morr.

- T. scolopacinaris* Gn. = *rubiginosus* Morr. Should be found in New Jersey.

EXELIS Gn.

- E. pyrolaria* Gn. = *approximaria* Pack. Should occur in New Jersey.

SELIDOSEMA Hbn.

- S. humaria* Gn. Caldwell (Cr), Forest Hill, VII (Wdt), Newark, VII, 20.
S. umbrosaria Gn. Staten Island, VI (Ds), Forest Hill, on hemlock, IX (Wdt), Elizabeth, VIII, 16 (Kp), Newark, VII, 4: larva on horse-chestnut, elm, &c.

CLEORA Curt.

- C. cribraria* Gn. Caldwell (Cr): larva on willow and poplar.
C. indicataria Wlk. = *polygrammaria* Pack. "New Jersey," Staten Island, VII (Ds).
C. pampinaria Gn. Newark, V to VIII (Soc), Caldwell (Cr), Staten Island, VII, VIII (Ds), Jamesburg, VIII, 11, New Brunswick, IX: larva on apple, pear, straw-, cranberry, willow, poplar, ash, &c.
C. larvaria Gn. Hopatcong (Pm), Orange Mts., IX (Wdt), Caldwell (Cr): larva on willow, wild cherry, &c.

MELANOPHIA Hulst.

M. canadaria Gn. Throughout the State, III-VII: larva on tamarack, spruce, pine, hemlock, *Myrica*, &c.

ÆTHALOPTERA Hulst.

A. intextata Wlk. = *anticaria* Wlk. Bloomfield, V, VII (Wdt), Staten Island, VI (Ds), Newark.

GLENA Hulst. = TEPHROSIA.

G. cognataria Hbn. Newark, V (Bwl).

ECTROPIS Hbn.

E. crepuscularia Schif. Throughout the State IV to IX, common: larva on apple, pear, plum, elm, maple, clover, etc.

EPIMECIS Hbn.

E. hortaria Fabr. Hopatcong (Pm), Elizabeth, VIII, 4 (Kp), Staten Island, V to VII (Ds), Newark (Ang): larva on tulip tree.

LYCIA Hbn.

L. ursaria Pack. Hopatcong, Plainfield (Pm), Newark, III (Wdt): larva on poplar, elm, wild cherry, &c.

L. cognataria Gn. Throughout the State, V to VII: larva on a great variety of orchard and small fruits and forest trees.

NACOPHORA Hulst.

N. quernaria S. and A. = *pænulataria* Grt. Staten Island, VI (Ds), Jamesburg, VII, 4 (Lt), Newark, IV, 4 (Ang): larva on oak.

N. cupidaria Grt. New York, rare (Bt).

RHAPHIDODEMAS Hulst. = PHIGALIA.

R. olivacearia Morr. Should be found in the State.

R. titea Cram. = *strigataria* Minot. Staten Island, III and IV, larva on rose, birch, maple, elm, &c.

ERANNIS Hbn. = HYBERNIA.

E. tiliaria Harr. The "lime tree moth"; occurs late in fall throughout the State, though hardly common: larva on basswood, elm, apple, pear, &c.

CINGILIA Wlk. = CATERVA.

C. catenaria Cram. Throughout the State, IX: larva on *Vaccinium*, *Rubus*, *Rhus toxicodendron*, *Myrica*, *Genista*, *Quercus*, &c.

ANAGOGA Hbn.

A. occiduaria Wlk. = *pulveraria* Auct. Hopatcong (Pm) : larva on willow, hazel, beech, maple, &c.

SICYA Gn.

S. macularia Harr. Likely to be found in New Jersey.

THERINA Hbn.

T. pellucidaria G. and R. = *bibularia* G. and R. "New Jersey."

T. endropiaria G. and R. Hopatcong (Pm), Newark, VI (Wdt), Staten Island, VI (Ds) : food plants, hornbeam, oak.

T. athasiaria Wlk. Lahaway, V, 28, Cologne, V, 24, common.

T. fiscellaria Gn. New Brunswick.

T. fervidaria Hbn. Staten Island, IX, X (Ds), Caldwell (Cr), Atco, IX, 27 (Kp), Jamesburg : larva on beech, birch, cherry, elm, spruce, &c.

METROCAMPA Gn.

M. margaritata L. Staten Island, VI, VIII (Ds), New Brunswick, X : larva on birch, elm, hornbeam, oak, poplar, willow, &c.

M. perlata Gn. Newark, VIII, IX (Soc), Hopatcong (Pm).

EUGONOBAPTA Warr.

E. nivosata Gn. (*Acidalia*). Hopatcong (Pm), Orange Mts., VII, 4 (Lt), Newark, VII (Wdt), Caldwell (Cr).

ENNOMOS Tr.

E. alniaria Linn. Hopatcong (Pm), Newark, IX, X (Wdt), Staten Island, X, XI (Ds), New Brunswick, X, locally common throughout the State : larva on birch, chestnut, elm, linden, &c.

E. subsignaria Hbn. Caldwell (Cr), Newark, VII (Wdt), Staten Island, VII, VIII (Ds), New Brunswick, Jamesburg : larva on apple, basswood, elm, linden, poplar, etc.

XANTHATYPE Warr. = ANGERONA.

X. crocotaria Fabr. Throughout the State, June to September, locally common : larva on strawberry, currant, gooseberry.

PLAGODIS Hbn.

P. serinaria H. S. Staten Island, VI (Ds), Newark, VIII (Ang) : *floscularia* Grt., and *rosaria* G. and R., are the same species or at most varieties.

P. keutzingaria Pack. New Jersey, probably : larva on apple.

P. fervidaria H. S. New Jersey, probably : larva on maple and ash.

P. alcoolaria Gn. Staten Island, V (Ds).

P. phlogosaria Gn. Newark, VIII : larva on wild cherry.

HYPERITIS Gn.

H. amicaria H. S. Occurs throughout the State, V to VII, commonly : larva on alder, beech, birch, hornbeam, *Hypericum*, oak, etc. The form *alienaria* H. S., occurs with the type.

ANIA Steph. = NEMATOCAMPA.

A. limbata Haw. = *flimentaria* Gn. Newark, VI, VII, on oak, Forest Hill, V, 7 (Wdt), Staten Island (Ds), New Brunswick : feeds on most orchard and small fruits, also nut trees, maple, etc.

GONODONTIS Hbn. = ENDROPIA.

G. hypochraria H. S. Hopatcong (Pm), Newark, V, VI, VII (Wdt), Caldwell (Cr), Staten Island, V and VI (Ds).

G. warneri Harv. Likely to occur in New Jersey.

G. duaria Gn. Newark, V and VI (Soc), Caldwell (Cr), Staten Island, V and VI (Ds), Anglesea, VI, 10.

G. obfirmaria Hbn. Staten Island, V (Ds), Caldwell (Cr), Clementon, V, 10 (Kp), V, 15, very active and difficult to capture (Lt), Lahaway, V, Cologne, VI.

EUCHLÆNA Hbn. = ENDROPIA.

E. serrata Dru. Hopatcong (Pm), Caldwell (Cr), Staten Island, VI (Ds), Woodbury, VI, 8 (Kp), Newark.

E. obtusaria Wlk. "New Jersey" : food plant touch-me-not, *Impatiens*.

E. effectaria Wlk. Hopatcong (Pm).

E. johnsonaria Fitch. = *bilinearia* Pack. Newark, VI, VIII (Soc), Elizabeth, VIII, 19 (Kp), Anglesea, IV, 20, Jamesburg, VIII, 10 (Sm), Caldwell (Cr), Hopatcong (Pm) : larva on oak, cherry, etc.

E. amoenaria Gn. Boonton, VIII (Wdt), Caldwell (Cr).

E. astylusaria Wlk. Orange Mts., V, (Wdt).

E. vinulentaria G. & R. Scarce near New York (Bt).

E. marginata Minot. Anglesea (Lt).

E. pectinaria Schiff. New Jersey, probably ; food plants, oak and poplar.

SELENIA Hbn.

S. kentaria Grt. Hopatcong (Pm), Newark (Wdt) : food plants, basswood, beech, birch, maple, oak, etc.

S. alciphearia Wlk. Should occur in New Jersey.

EPIPLATYMETRA Grt.

E. madusaria Wlk. Caldwell (Cr), Staten Island, VI (Ds).

METANEMA Gn.

M. inatomaria Gn. Newark, VIII: food plant, poplar.

M. determinata Wlk. = carnaria Pack. Caldwell (Cr), Newark, VIII.

M. quercivoraria A. & S. New Jersey, probably; food plants, oak, elm, poplar, willow.

M. textrinararia G. & R. Staten Island, V (Ds).

PRYOCYCLE Gn.

P. armataria H. S. New Jersey, probably: larva on currant.

P. decoloraria Hulst. Should occur in the State.

STENASPILATES Pack.

S. zalissaria Wlk. Staten Island, V (Ds).

AZELINA Gn.

A. peplaria Hbn. = hubnerata Gn. Throughout the State, V-VIII, common: food plant, maple.

SYSSAURA Hbn. = DREPANODES.

S. infensata Gn. Staten Island, IX (Ds), Anglesea, VI, Bayside, IX, 21, Newark, VIII: the variety *bicessaria* Wlk. = *varus* G. and R. = *puber* G. and R., larva on Juniper, occurs with the type.

CABERODES Gn.

C. confusaria Hbn. Throughout the State, VI, VII and VIII, in many varieties: larva on clover.

C. majoraria Gn. Hopatcong (Pm), Caldwell (Cr), Newark, VIII.

TETRACIS Gn.

T. crocallata Gn. Caldwell (Cr), Newark, VI, VIII (Soc), Staten Island, VII, VIII (Ds): larva on sumach, chestnut and spice bush.

SABULODES Gn. = CHÆRODES.

S. lorata Grt. Hopatcong (Pm), Caldwell (Cr), Newark, V, VI, VIII (Soc), Staten Island, VI (Ds): larva on sweet fern (*Comptonia asplenifolia*) and hemlock.

S. sulphurata Pack. Hopatcong (Pm), Caldwell (Cr), Orange Mts., VII (Wdt), Staten Island, V (Ds).

S. depontanata Grt. Hopatcong (Pm), Caldwell (Cr), Orange Mts., VII (Wdt), Elizabeth, VII, 20 (Kp), Staten Island, VII (Ds), Del. Water Gap, VII, 14 (Jn).

S. furciferata Pack. Rare near New York (Bt).

S. transversata Dru. Throughout the State, VII, IX, X, common locally : larva on currant, maple, *Polygonum*, etc.

ABBOTTANA Hulst. = CHÆRODES.

A. clemataria S. and A. Caldwell (Cr), Newark, V, VIII (Soc), Staten Island, V (Ds), and probably throughout the State : larva on elm and clematis.

Family NOTODONTIDÆ.

Rather plump, robust moths of good size, with somewhat retracted head, short palpi, rather short antennæ and often weak tongue. The thorax is comparatively somewhat short, while the abdomen is usually long, cylindrical and rather obtusely terminated. The legs are moderate or rather short. The wings are rather long and not very broad, the inner margin often produced into a tooth, lobe or similar process. The larvæ are naked, or have only sparse hair ; but often have spines, spurs, humps or other prominences. Sometimes the anal legs are modified into slender processes resembling a long fork. Most of them are solitary and live exposed, feeding on the foliage of trees and shrubs ; but some live in large colonies consisting of the members of one batch of eggs, while a few others live in webs or small tents.

Several of the species are injurious, but arsenical sprays can be successfully used in most instances.

APATELODES Pack.

A. torrefacta S. and A. Newark (Soc), Staten Island (Ds), Hopatcong (Pm), generally distributed, the adults VI, VIII : larva on wild cherry, blackberry, sassafras, hazel, etc., etc.

A. angelica Grt. Hopatcong (Pm) : larva on ash and lilac, IX, adults, VI and VII.

NOTODONTA Ochs.

N. stragula Grt. Newark (Soc), VII, VIII, 28 (Sb), V (Wdt), Caldwell (Cr), Hopatcong (Pm), Newark, VII. Double-brooded ; moths in V, VI and VII, VIII : larva on willow and poplar.

N. georgica H. S. Newark, VIII (Sb), Hopatcong (Bt) : double-brooded, larva on oak, mostly white oaks (Dyar) and wild cherry (Sb).

N. elegans Strk. Hopatcong (Pm), Newark.

NADATA Wlk.

N. gibbosa S. and A. Newark, VIII, 7 (Sb), V and VI (Wdt), Caldwell (Cr), Staten Island, V, VI (Ds), Jamesburg, VII, 4 (Lt), Woodbury, VI, 8 (Kp), Hopatcong (Pm), New Brunswick, VII. Double brooded : larva on oak, maple, white birch and plum.

var. *doubledayi* Pack. Occurs with the type, but more rarely.

HYPARPAX Hbn.

H. aurora S. and A. Newark, VI, 19, VII, 3, VIII, 23, IX (Sb), Woodbury, VI, 8 (Kp) : larva on oak.

SYMMIRISTA Hbn. = EDEMA Wlk.

S. albifrons S. and A. Ft. Lee, Hopatcong (Bt), Staten Island, VII (Ds), Newark (Soc), VI, VII, VIII (Bl), Caldwell (Cr), Jamesburg. Generally distributed, the larva gregarious and sometimes very abundant on oak ; acres of scrub land almost defoliated near Jamesburg in 1896.

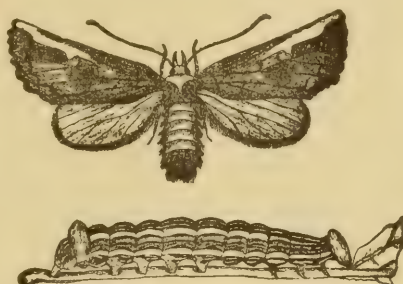


Fig. 207.—*Symmirista albifrons* and its larva.

NERICE Wlk.

N. bidentata Wlk. Hopatcong (Pm, Bt), Caldwell (Cr), New Brunswick ; quite generally distributed : the larva on elm.

CERURA Schrank.

C. multscripta Riley. Newark, V, VII (Wdt), Hopatcong (Pm) : larva on willow and poplar. All the larvæ in this genus have the anal legs produced into a slender fork.

C. occidentalis Lint. Newark, VI (Bwl), Staten Island, VII (Ds) : larva on willow and poplar, imagoes, V and VI, and VII and VIII.

C. borealis Bdv. Hopatcong (Pm), Forest Hill, Newark, VI (Bwl), V and VIII (Wdt), Staten Island, VI (Ds), Anglesea, VI, 20 (Lt), New Brunswick. Double-brooded : the larva on wild cherry and allied plants.

C. cinerea Wlk. Hopatcong (Pm), and undoubtedly throughout the State. Double-brooded : the larva on willow and poplar.

MELALOPHA Hbn. = ICHTHYURA.

M. albosigma Fitch. Hopatcong (Bt), Newark, VI, 20 (Sb) : adults, V, VII, VIII ; larva solitary on willow and poplar.

M. apicalis Wlk. Hopatcong (Pm), common along the Hudson River Valley (Dyar) : larva solitary on willow and poplar.

M. inclusa Hbn. Common and generally distributed; adults, V to VII and VIII to X: larva gregarious on willow and poplar.

GLUPHISIA Bdv.

G. septentrionalis Wlk. Ft. Lee, V-VIII (Bt), Hopatcong (Pm): larva on willow, poplar, yellow birch and sweet gum.

EUMELIA Neum.

E. severa Hy. Edw. Ft. Lee (Bt, Dyar): larva on Poplar.

PHEOSIA Hbn.

P. dimidiata H. S. = *rimosa* Pack. Hopatcong (Bt), Newark (Soc), Ocean Co.

P. basitriens Wlk. New Jersey (Packard *vide* Palm).

LOPHODONTA Pack.

L. ferruginea Pack. Hopatcong (Bt), Newark (Soc), VII at light (Wdt); adults, V-VI, VII-VIII: larva on paper birch.

L. angulosa S. and A. Hopatcong (Bt), Newark (Soc), VI, 1 (Sb), VIII (Kr); adults, VI and VII: larva on red oaks (Dyar).

LOPHOPTERYX Steph.

L. capucina Linn. New Jersey, near Philadelphia (Blake); also recorded from the State by Packard. The larva lives in Europe on oak, poplar, alder and hazel (Pack).

DATANA Wlk.

D. angusii G. and R. Newark (Soc), Staten Island, VI (Ds), Hopatcong (Pm), Freehold (U S Ag), New Brunswick, locally common. Adult, VI; larva on huckleberry, witch-hazel, hickory, etc.



Fig. 208.—Yellow-necked caterpillar, *Datana ministra*; *a*, larva; *b*, moth; *c*, eggs; *d*, single egg, enlarged.

- D. ministra* Dru. Occurs throughout the State in VI and VII. The larva is the common "yellow-necked caterpillar" of the apple, which sometimes causes considerable injury on nursery trees: it feeds also on a great variety of other fruit, forest and shade trees.
- D. drexellii* Hy. Edw. Staten Island, VI (Ds), Newark (Ang), and will be found throughout the State: larva on huckleberry, witch-hazel and linden.
- D. major* Grt. and Rob. Newark, VI (Soc), Staten Island, VII (Ds), New Brunswick: larva on witch-hazel, sumac and *Andromeda*.
- D. palmii* Beut. Del. Water Gap (Pm), larva on huckleberry (Bt).
- D. perspicua* G. and R. Newark, VIII (Bwl), Staten Island (Ds), Hopatcong (Pm), g. d., VI-VIII: larva sometimes very abundant on sumach.
- D. integerrima* G. and R. Caldwell (Cr), Newark (Soc), VIII (Bwl), Staten Island, VI, VII (Ds), New Brunswick, Hammonton, g. d., not rare: larva sometimes common and locally injurious on walnut and hickory; though it also feeds on other plants.
- D. contracta* Wlk. Newark (Soc), Staten Island (Ds), and have seen it throughout the State, VI, VII, IX, X: the larva is locally common on oak, chestnut and rarely hickory. All the larvæ in this genus are gregarious and live in large colonies though forming no web.

IANASSA Wlk.

- I. lignicolor* Wlk. Caldwell (Cr); g. d., not rare: larva on oak, beech and white birch.

DASYLOPHIA Pack.

- D. anguina* S. and A. Newark, VII, 2 (Sb), Jersey City and throughout the State; adults, VI, VIII: larva on locust, false indigo, clover, &c.
- D. thyatiroides* Wlk. = *interna* Pack. Rare near New York, VII, larva on Hickory (Bt), Jamesburg, one specimen.

SCHIZURA Doub. = CÆLODASYS Pack.

- S. concinna* S. and A. Occurs throughout the State, and is sometimes common: adults, V, VI and VIII, larva in colonies on a great variety of plants, including most of our orchard and small fruits.
- S. eximia* Grt. Morris Plains (Edw). A rare species: the larva on apple, willow, maple and other trees.
- S. ipomœæ* Doubl. = *biguttata* Pack. Hopatcong (Pm), Staten Island, VI (Ds), Newark, VI, VIII (Wdt); g. d., not rare, VI, VII, VIII; larva on blackberry, huckleberry, maple, oak, birch, &c.

The varieties *telifer* Grt., and *cinereofrons* Pack., occur with the type, but are less abundant.

- S. unicornis* S. and A. Newark, V (Wdt), Staten Island, VI (Ds), Hopatcong (Pm), throughout the State and sometimes in numbers: the larva feeds on most orchard, many shade and forest trees and some shrubby plants.

S. apicalis G. and R. Newark (Soc), very rare near New York (Bt).

S. badia Pack. Newark (Ang), Morris Plains (Edw), Hopatcong (Bt).

S. leptinoides Grt. Morris Plains (Neum), Newark (Ang), Woodbury, VI, 8 (Kp). Adults, VI and VIII; larva on oak, hornbeam, beech and various nut trees.

HETEROCAMPA Doub.

H. obliqua Pack. Hopatcong, VI, VII (Bt), Newark, VII, 20, light (Sb), Atlantic States (Dyar): larva on oak, *Q. macrocarpa* (Dyar).

var. *trouvelotii* Pack = *brunnea* G. and R. Occurs with the type.

H. umbrata Wlk. = *pulverea* G. and R. Not common near N. Y. (Bt), Newark (Ang), Caldwell (Cr): moths in V, VI and VIII, larva on oak; *Q. tinctoria* (Dyar).

H. manteo Doub. = *subalbicans* Grt. Not common near N. Y. (Bt), Newark: larva on apple, oak, basswood, persimmon, walnut, &c.

CECRITA Wlk.

C. biundata Wlk. Newark (Soc), at light (Wdt), not common near N. Y. (Bt), Hopatcong (Pm), Merchantville, VIII, 26 (Kp): May and August, larva on cherry and a great variety of forest and shade trees.

C. guttivitta Wlk. Newark (Soc), not common near N. Y. (Bt): larva on maple, oak, chestnut, beech, &c.

C. bilineata Pack. G. d., V to VIII, throughout the State: the larva not rare on elm at New Brunswick; but is said to feed also on beech.

MISOGADA Wlk.

M. cinerea Pack. = *unicolor* Pack., et *marina* Pack. Newark (Soc), Caldwell (Cr), New Jersey (Packard, *vide* Palm): Adults, V, VI, VII, VIII; larva on maple and sycamore.

MACRUROCAMPA Dyar.

M. marthesia Cram. Newark, rare at light (Wdt), July (Kr), Staten Island (Ds), Hopatcong (Pm): larva on oak, beech and chestnut.

ELLIDA Grt.

E. caniplaga Wlk. Montclair, electric light, VI, 8 (Kearfott).

Family THYATIRIDÆ.

Medium or rather large moths with soft gray and pink velvety colors, resembling the owlets in appearance, the anal angle of the fore wings usually produced into a tooth or lappet. The main family character is in venation. We have only a very few species.

EUTHYATIRA Smith.

T. pudens Gn. Should occur in Northern New Jersey: the larva in spun leaves of dogwood, *Cornus florida* (Dyar).

PSEUDOTHYATIRA Grt.

P. cymatophoroides Gn. Jersey City, VI (Kr), Newark and Boonton, VI (Bwl), Caldwell, (Cr), Staten Island, VI, VII (Ds), Elizabeth, VIII, 22 (Kp).

var. *expultrix* Grt. Occurs with the type and is more common. The larva on birch, looks like a Notodontian (Dyar), and also feeds on maple, oak, &c.

THYATIRA Ochs.

H. scripta Gosse. Bayonne (Bt), Hopatcong (Pm): the larva on blackberry and raspberry.

H. rectangula Ottol. Will almost certainly be found in northern New Jersey, when its distinctness from the preceding is recognized.

Family EPIPLEMIDÆ.**CALLEDAPTERYX** Grt.

C. dryopterata Grt. Will probably be found when sought for.

Series TINEIDES.

This series is almost impossible of popular definition based on superficial characters! There is no one criterion that will serve to make them recognizable to the ordinary observer save that nearly all the very small species belong here.

In the larval stage tubercle VII is an ordinary wart and does not form a leg-plate; IV and V united except in the lowest forms, in the highest I and II are also united. Crotchets of the abdominal feet usually forming a nearly complete circle.

This latter character is easily seen in most of the caterpillars, a large proportion of which live in concealment between folded leaves, in cases, or as borers or miners in vegetable tissue.

Super-family PYRALIDOIDEA.

This contains a large number of small or very small moths varying in appearance and agreeing chiefly in having the hind wings with three free inner veins, and along the costa the marginal and sub-marginal united for a short distance though separated at the base and tip. The families into which the super-family is divided are more easily known.

The Pyraustidæ have rather thinly scaled wings, the primaries pointed, the secondaries never larger and sometimes very small. The colors are largely yellowish or white, with deeper yellow markings and they may or not be continuous on both wings. Sometimes they are contrasting, white and black, and many are red, brown and of other shades. The body is, as a rule, slender, the head distinct and prominent, antennæ slender, of good length, in the males sometimes knotted or thickened. The larvæ are nearly always green with pale stripes and spots, or without any markings at all. The head and a shield on the first thoracic segment, sometimes also the tubercles are shining black, brown or yellow. They live in webs or tents and may be solitary as is the rule, or social.

The family Pyralididæ contains much greater variations in appearance, some resembling the preceding, but with broader wings and brighter colors, others with ashen gray, rough vestiture and broader-shouldered primaries.

The Phycitidæ are ashen gray species, with narrower primaries and broader secondaries, the latter without markings, the former banded and mottled with blackish or brown. Usually they have a very smooth or even a glistening appearance, and sometimes the contrasts in white and black are quite strong. The larvæ vary greatly in habit, but almost always live in a tube of silk, whether they crumple an apple-leaf, live in a grain-bin or feed on scales.

The Galleriidæ or "bee moths" are curiously streaked moths, with a notch at the end of the forewing in the typical species, the costa very decidedly arched. The larva of the bee moth lives on wax in bee-hives, mining a gallery lined with silk through the centre of the combs, out of sight of the bees. There is not much chance for them, however, in modern hives, carefully looked after, nor in strong healthy colonies.

The Crambidæ are slender moths with a distinct head, bearing long, projecting palpi, like some of the deltoids. The fore-wings are narrow, squarely cut at the ends, the hind wings large and broad, closely folded when at rest under the primaries, which are tightly wrapped around them. When at rest the little moths look like slender cylinders, tapering from the tip of the pointed palpi to the squarely cut-off end of the wings. These wings are generally streaked with white, gray, yellow, gold and silver, some of the most brilliant combinations being found on a very reduced scale.

The larvæ live in silken tubes on or below the surface of the ground, and some of them are known as root web-worms.

The Pterophoridæ close the Pyralid series and are known as plume-moths because the wings are split up into from two to five plumes or feathers, which makes the species recognizable at a glance. The caterpillars are hairy, and at first sight resemble miniature Arctiids; but they spin up leaves, and of course other differences of a radical character exist.

Family PYRAUSTIDÆ.**MARGARONIA** Hbn.

- M. quadristigmalis* Gn. Newark, VI, VII (Wdt), Jersey City Hts., VII, 20 (Sb).
M. hyalinata Linn., (*Eudiotis*). Newark (Wdt), Ocean county, not rare : larva in stems of cucurbs, but not injurious in New Jersey.
M. nitidalis Cram. "New Jersey," Newark : larval habits as in *hyalinata*.

CONCHYLODES Gn.

- C. platinalis* Gn. New Jersey, probably.

HYMENIA Hbn.

- H. perspectalis* Hbn. Newark, X, at light (Wdt).
H. recurvalis Fabr. Newark.

DIATHRAUSTA Led.

- D. pisusalis* Wlk. Near New York (Bt).

DESMIA Westw.

- D. funeralis* Hbn. = *maculalis* Westw. Jamesburg, VII, 4 (Lt), Newark, VIII, at light (Wdt), Morristown (U S Ag) : larva on grape.

PILOCROCIS Led.

- P. ramentalis* Led. Newark, VI, rare (Wdt).

CINDAPHIA Led.

- C. bicoloralis* Gn. Pleasantville (Lt), Newark, IX (Wdt), New Brunswick, Lahaway, V, 20, not rare at light.

PHLYCTÆNIA Hbn.

- P. acutella* Wlk. Near New York (Bt), Anglesea, VI, 20.
P. ferrugalis Hbn. = *Botis harveyana* Grt. Throughout the State, May to November, locally not rare.
P. terrealis Tr. (*Botis*). New Jersey, probably.
P. extricalis Gn. = *Botis opilalis* Grt. New Brunswick, V, Jamesburg, VI, 16, Lahaway, V, 20.
P. tertialis Gn. = *Botis plectilis* G. and R. Anglesea (Lt), Elizabeth, VIII, 16 (Kp), Newark, VI (Wdt).

NOMOPHILA Hbn.

- N. noctuella* S. V. Common throughout the State, all season.

PYRAUSTA Schrank. = BOTIS.

- P. octomaculata* Linn. New Jersey, common (Bt).
- P. acronalis* Wlk. = *Botis rufofimbrialis* Grt. Fairmount Cemetery, V, 21 (Sb), common near New York (Bt).
- P. orphisalis* Wlk. = *generosa* G. and R. Near New York, on *Monarda fistulosa* (Bt).
- P. inaequalis* Gn. Orange Mts., VII, 4 (Lt), V, 15, Fairmount Cemetery, IV, 25 (Sb), Irvington, V, VI (Wdt), Newark, Jamesburg, VI, 16: larva on thistle.
- P. borealis* Pack. Recorded as near New York (Bt).
- P. signatalis* Wlk. Atco, Anglesea, IX (Lt), Elizabeth, VIII, 25 (Kp), Anglesea, III, VII, VIII and IX.
- P. opalialis* Gn. Orange Mts., V, 8 (Wdt).
- P. laticlavata* G. and R. Anglesea, VI, VIII, 14 (Lt), Westville, VIII, 25 (Kp).
var. *cinerosa* G. and R. Orange Mts., VIII (Wdt, Kp), Cape May County.
- P. niveiciliaris* Grt. Orange Mts., VI, VIII, g. d. (Wdt).
- P. unifascialis* Pack. = *subolivalis* Pack. Ft. Lee (Bt).
- P. fumalis* Gn. = *badipennis* Grt. Newark, VIII, rare (Wdt), Anglesea, VI, IX.
- P. fodinalis* Led. New Jersey, probably.
- P. penitalis* Grt. "New Jersey," New Brunswick, VII.
- P. illibalis* Hbn. Anglesea, VII, 21 (Lt), VI, 10 (Sm), Newark.
- P. futilalis* Led. = *erectalis* Grt. Orange Mts., VI, VII (Wdt), "New Jersey" (College coll.): larva on dog-bane.
- P. adipaloides* G. and R. Orange Mts., VII, Newark, X (Wdt).
- P. helvalis* Wlk. = *oscitalis* Grt. Ft. Lee (Bt), Newark district, g. d., VI, VIII, X (Wdt).
- P. oxydalis* Gn. = *flavidalis* Gn. Waverly, VII (Wdt), Newark.
- P. langdonalis* Grt. New Jersey, probably.
- P. thestialis* Wlk. = *magistralis* Grt. Woodside, V, VI, VIII, X (Wdt), Ft. Lee, on *Clethra alnifolia* (Bt).
- P. ranalis* Gn. (*Blepharomastix*), Westville, VII, 2 (Lt), Newark, V and VI (Wdt), Hudson Co., VI, 13 (Sb), Jamesburg, VII, VIII.
- P. pertextalis* Led. = *gentilis* Grt. Newark (Sb), "New Jersey."
- P. æglealis* Wlk. = *5-linealis* Grt. Newark, VIII, rare (Wdt), Woodland Cemetery, VII, 4 (Sb).
- P. theseusalis* Wlk. = *feudalis* Grt. Forest Hill (Wdt), New Brunswick, Jamesburg, VIII: larva webbing up tips of ferns.
- P. submedialis* Grt. Occurs near New York (Bt).
- P. nelumbialis* Sm. Newark, VIII (Wdt), Jersey City Hts., V, 26 (Sb), Bordentown, Riverton, the larva in stems and flowers of the Egyptian lotus.

P. argyralis Hbn. = *ventralis* Grt. Fort Lee (Bt), Newark, g. d., VI, VIII (Wdt), Jersey City Hts., V, 22, Hemlock Falls, V, 15 (Sb), Clementon, V, 16 (Lt).

MECYNA Gn.

M. reversalis Gn. Jamesburg, VII, 28 (Lt), Anglesea, VI.

PANTOGRAPHIA Led.

P. limata G. and R. Newark, Linden, and throughout the State, though hardly common.

SAMEA Gn.

S. ecclesialis Gn. Orange Mts., VII, 4 (Lt).

CROCIDOPHORA Led.

C. serratissimalis Zell. Newark, VI (Wdt), New Brunswick.

C. tubercularis Led. Orange Mts., VI, VII (Wdt).

LOXOSTEGA Hbn.

L. similalis Gn. = *Eurycreon rantalis* Gn. Throughout the State, not rare: the larva is the "garden web-worm," which has been locally a first-class pest in other States. I have not heard of it in troublesome numbers in New Jersey.

L. allectalis Grt. Recorded as near New York (Bt).

L. chortalis Grt. Lahaway, V, 20.

L. dasconalis Wlk. Recorded from near New York (Bt), Newark (Sm).

L. helvialis Wlk. = *Botis citrina* G. and R. Jersey City Hts., VII, 18 (Sb), Anglesea, VII, 24, VIII, 7 (Lt), V, 28, IX, 3 (Sm).

L. oblitalis Wlk. = *Botis marculenta* G. and R. Elizabeth, VIII, 16 (Kp), Newark, V, VI, VII (Wdt), New Brunswick.

L. mancalis Led. New Brunswick.

L. sticticalis Linn. Newark (Wdt).

L. cereralis Zell. Camden, VI, 28 (Kp), Westville, V, 4, Jamesburg, VII, 4 (Lt), Lahaway, V, 20.

EUSTIXIA Hbn. = THELCTERIA.

E. pupula Hbn. Throughout the State and almost throughout the season.

SCOPARIA Haw.

S. centuriella S. V. Hopatcong (Bt), Newark, New Brunswick.

S. libella Grt. Orange Mts., VI, Woodside, IX, on hemlock (Wdt), Newark.

EVERGESTIS Hbn. = MESOGRAPHE.

E. straminealis Hbn. Newark, VI, VIII, g. d., larva on horse radish (Wdt).

E. rimosalis Gn. Should be found in New Jersey.

DICYMOLOMIA Zell.

D. julianalis Wlk. Woodside, VII (Wdt).

CHALCÆLA Zell.

C. aurifera Zell. Recorded as near New York (Bt).

LIPOCOSMA Led.

L. perfusalis Wlk. = *siccalis* Wlk. Westville, VII, 2, Jamesburg, VII, 4 (Lt).

L. fuliginosalis Fern. Anglesea, one specimen (Lt).

CATACLYSTA Hbn.

C. bifascialis Rob. New Jersey, probably.

C. fulicalis Clem. New Brunswick, VII, Newark, Anglesea.

HOMOPHYSA Gn.

H. glaphyralis Gn. Westville, VII, 2 (Lt), Waverly, VI (Wdt).

H. sesquistrialis Hbn. Westville, VII, 21 (Lt).

HYDROCAMPA Latr.

H. oblitalis Wlk. Riverton, II, 10, the larva living in cases on the leaves of lily and other water plants in greenhouses: rare outdoors in summer.

H. obscuralis Grt. Occurs near New York (Bt).

H. albalis Rob., (*Oligostigma*). Newark, VI, IX, rare (Wdt).

H. allionealis Wlk. Occurs near New York (Bt).

H. gyralis Hulst. Anglesea (Lt).

H. icciusalis Wlk. = *genuinalis* Led. Anglesea, V, 30, VIII, 14 (Lt), Lahaway, V, 20, along ditches.

H. ekthlipsis Grt. New Brunswick.

H. stenialis Gn. Riverton, V, 30, Anglesea, VII, 16 (Sm), Jamesburg, VII, 4 (Lt), Newark, at light, VI, VII, Orange Mts., VI, common (Wdt).

SCHÆNOBIUS Dup.

S. sordidellus Germ. Newark, light, VI and VII (Wdt).

S. unipunctellus Rob. Anglesea, IX, 3 (Lt).

S. melinellus Clem. Anglesea (Lt).

S. forficellus Thunb. Anglesea, VI, 15 (Lt.)

NYMPHÆELLA Grt.

N. maculalis Clem. = *dispar* Grt. Lahaway, V, 20.

Family PYRALIDIDÆ.**Sub-family PYRALIDINÆ.****ARTA Grt.**

A. statalis Grt. Anglesea, VII, 10 (Lt), near New York (Bt).

GALASA Wlk.

G. rubidana Wlk. Anglesea, VII, 24 (Lt), near New York (Bt), New Brunswick, Newark

FABATANA Wlk. = SIPAROCERA Rob.

F. oviplagalis Wlk. = *nobilis* Grt. Ocean County, not rare.

OMPHALOCERA Led.

O. cariosa Led. Near New York on *Anoma triloba* (Bt).

PYRALIS Linn. = ASOPIA.

P. farinalis Linn. Throughout the State: the larva in stored products, chiefly grain and similar substances. Usually it occurs only in waste material and corners, so that cleanliness and preventing such accumulations is all that is needed to get rid of it.

P. costalis Fabr. Throughout the State all season. The larva is the "Clover-hay worm" and sometimes injures it a little in the stack.

P. olinalis Gn. Anglesea, VI (Sm), VII, 21 (Lt), Jersey City Hts., VI, 15 (Sb).

P. himonialis Zell. Near New York (Bt), Newark (Sb), Jamesburg, VI, 16.

P. sodalis Wlk. = *squamealis* Grt. Likely to occur in New Jersey.

P. cohortalis Grt. Occurs near New York (Bt).

AGLOSSA Latr.

A. cuprealis Hbn. = *domalis* Gn. Anglesea (Lt), Newark, Jersey City Hts., VI, 28 (Sb).

Sub-family EPIPASCHIINÆ.**EPIPASCHIA Clem.**

E. superatalis Clem. Occurs throughout the eastern U. S.; the larva on sunach.

LANTHAPHE Clem.

L. platanella Clem. New Brunswick: the larva makes a web on the under surface of leaf of sycamore.

BENTA Wlk.

S. asperatella Clem. Newark, Philadelphia, Pa.: larva on locust.

TETRALOPHA Zell.

T. baptisiella Fern. Near New York (Bt); the larva on *Baptisia*.

T. militella Zell. Newark, VII, 15 (Wdt).

Family PHYCITIDÆ.

ACROBASIS Zell.

A. angusella Grt. Found near Brooklyn, N. Y., the larva boring into the leaf stems of hickory.

A. demotella Grt. Also found near New York, the larva boring into the ends of twigs of black walnut.

A. caryæ Grote. Ocean county, not rare: the larva bores into twigs of hickory.

A. rubrifasciella Pack. Occurs near N. Y. city (Bt), the larva in a case between leaves of sweet fern and alder.

A. comptoniella Hulst. Common near New York: the larva in a case between terminal leaves of *Comptonia* and *Myrica*.

A. hebescella Hulst. Ocean county, VI, larva on oak in a case.

MINEOLA Hulst.

M. amplexella Rag. Newark, V (Wdt).

M. vaccinii Riley. Throughout South Jersey on cranberry bogs in July. The larva is the "cranberry fruit-worm," and may be found on almost all bogs, its presence being indicated by the premature coloring of the berries. No serious injury has been caused in this State thus far.

M. indiginella Zell. Found throughout the State: the larva is an "apple-leaf crumpler," but also feeds on quince, plum, cherry, &c. It is sometimes numerous enough to cause decided injury in orchards. Usually the sprayings made for the codling moth are effective against this insect as well.

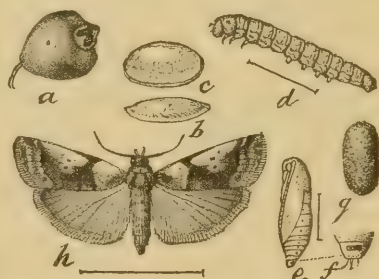


Fig. 209.—Cranberry fruit-worm, *Mineola vaccinii*; *a*, berry, with egg, natural size; *b*, *c*, egg, enlarged; *d*, larva; *e*, pupa; *f*, cocoon, natural size; *g*, *h*, adult; all enlarged; *g*, cocoon, natural size.

M. juglandis LeBaron. Also generally distributed, the larva on hickory, where I have frequently found it in June, in Ocean and Burlington Counties.

DIORYCTRIA Zell.

D. abietella S. V. Anglesea, VI, 20, and have seen the larva on pines in Ocean County in June.

PINIPESTIS Grote.

P. zimmermanni Grt. I have seen what I take to be injuries caused by the larva of this insect in Sussex and Warren Counties. It bores in pine and, in some localities in Pennsylvania, is seriously injurious.

NEPHOPTERYX Hbn.

N. ovalis Pack. Newark (Soc).

N. basilaris Zell. Ranges from Canada to Texas and will be certainly found in New Jersey.

TLASCALA Hulst.

T. reductella Wlk. Near New York (Bt), on *Gleditschia triacanthus*, the honey locust; imago May and June.

T. finitella Wlk. New Brunswick, Jamesburg.

MEROPTERA Grt.

M. pravella Grt. Anglesea, rare (Bt).

SALEBRIA Zell.

S. contatella Grt. Near New York in May (Bt), the larva on locust (*Robinia pseudacacia*).

S. celtidella Hulst. Near New York (Bt): the larve on *Celtis occidentalis*.

LAODAMIA Rag.

L. fusca Haw. Newark, light, V, VIII, Anglesea, common (Lt), the larva on *Vaccinium*.

ELASMOPALPUS Blanch.

E. lignosellus Zell. Newark, May (Wdt).

EPISCHNIA Hbn.

E. boisduvaliella Gn. Anglesea, V, 30.

MELITARA Wlk.

M. prodenialis Wlk. Lahaway, Anglesea, the larva in the leaves of the prickly pear or common cactus; but very local.

ZOPHODIA Hbn.

Z. grossulariæ Pack. Has been recorded from New Jersey; the larva lives in gooseberries, causing premature coloring.

EUZOPHORA Zell.

E. semifuneralis Wlk. Newark, VI (Wdt), New Jersey (Lt): moths May to August, larva a borer in plum, which causes severe injury in Illinois.

E. ochreifrontella Zell. Anglesea, VIII, 4, New Brunswick, VIII.

VITULA Rag.

V. edmandsii Pack. Anglesea, common at light.

CANARSIA Hulst.

C. ulmiarrosorella Clem. New Brunswick, VII and VIII, the larva very common on the elms: the species probably occurs throughout the State.

C. hammondi Riley. Anglesea, V, 30, Jamesburg: the larva feeds on the leaves of apple.

LÆTILIA Rag.

L. coccidivora Comst. Burlington and Cumberland Counties, the larva preying upon the tulip soft scale: all stages are found all season and the insects may winter as either larva or pupa.

HONORA Grt.

H. oblitella Zell. var. *undulatella* Clem. Anglesea, VI, 20, VII, 21, at light, common (Lt, Pm).

HOMÆOSOMA Curt.

H. electella Hulst. Anglesea, VII, 26, VIII, 24.

H. mucidella Rag. Anglesea, VII, 24.

EPHESTIA Gn.

E. kuehniella Zell. The "mediterranean flour moth." An introduced species which is becoming a nuisance in flour mills and in dried fruits, north and west. I have not actually seen it from New Jersey, but it will not be at all likely to pass us by.

E. elutella Hbn. "Found in all parts of the world, living in old fences, decaying wood and rubbish" (Hulst).

PLODIA Gn.

P. interpunctella Hbn. The "meal moth": larva on meal, flour, preserved fruits and the like, at all times: has been actually taken at Ridgewood, Newark and New Brunswick. The methods suggested against coleopterous pests in stored provisions are available here as well.

PEORIA Rag.

P. hæmatica Zell. Newark, VI, rare (Wdt).

Family GALLERIIDÆ.

GALLERIA Linn.

G. melonella Linn. The "bee moth": larva infests bee hives, running galleries lined with silk through the comb, and sometimes causing considerable injury.

APHOMIA Hbn.

A. sociella Linn. "New Jersey."

ACHRÆA Hbn.

A. grisella Fabr. "New Jersey."

Family CRAMBIDÆ.

PRIONAPTERYX Steph.

P. achatina Zell. Anglesea, VII, 21, 27 (Lt, Sm), Jamesburg, VI, 20.

CRAMBUS Fabr.

C. hastiferellus Wlk. Elizabeth, IX, 9 (Kp), Anglesea, IX.

C. pascuellus Linn. Jamesburg, VII, 4 (Lt): larva on grasses, and this is true of the species generally, unless otherwise mentioned.

C. girardellus Clem. Newark, VII (Wdt), Elizabeth, VII, 24 (Kp), Jamesburg, VII, 4 (Lt).

C. leachellus Zinck. Orange Mts., VII, VIII, Newark (Wdt), Jersey City Hts., V, 21, (Sb), Elizabeth, VIII, 6 (Kp), Westville, IX, 9, (Jn), Cumberland county, VI, 10, Anglesea, V, 1, IX, 3, very common.

C. præfectellus Zinck. Anglesea, V, 20, Clementon, IX, 9 (Lt), Jamesburg, V, 20.

C. laqueatellus Clem. Orange Mts., V, VI (Wdt), Jersey City Hts., V, 23 (Sb), Merchantville, V, 17 (Kp), Lahaway, V, 20, Jamesburg, V, VI, 6, Anglesea, V, 30, VIII, 31,

C. alboclavellus Zell. North Jersey (Sb), Jamesburg, VI, 20, VII, 4, on Cranberry bogs, Anglesea, VI, 20.

- C. agitatellus* Clem. Orange Mts., VI (Wdt), North Jersey (Sb), Elizabeth, VII, 20 (Kp), Westville, VII, 2 (Lt), Lahaway, on Cranberry bogs, V, 21, Jamesburg, VI, 10, Anglesea, V, 10, New Brunswick, VIII.
- C. albellus* Clem. Newark, VI, VII (Wdt), Elizabeth, VIII, 4 (Kp), Jamesburg.
- C. hortuellus* Hbn. Newark, light, VIII, IX (Wdt), Anglesea, VII, 11 (Lt), Lahaway, V, 21, Jamesburg, VI, 16, VII, 4, VIII, 10, common on cranberry bogs. The larva is the "girdle worm" of the cranberry grower and does some injury locally; very much less, however, in New Jersey than in Massachusetts.
- C. perllellus* Scop. = *sericinellus* Zell. New Jersey, probably.
- C. turbatellus* Wlk. = *bipunctellus* Zell. Waverly, V, VI (Wdt).
- C. elegans* Clem. New Brunswick, VII and IX.
- C. vulvivagellus* Clem. Boonton, VIII, IX (Wdt), Fort Lee (Bt), Elizabeth, IX, 9 (Kp), New Brunswick, Anglesea, Bayside, all in September: the larva is one of the root web-worms and is sometimes seriously troublesome to corn in southern New Jersey. Remedial measures are, fall or very early spring plowing of sod land, the use of kainit and nitrate of soda for fertilizer.
- C. ruricolellus* Zell. Elizabeth, VII, 19 (Kp), New Brunswick, IX, 18: the larva on grass and sheep sorrel.
- C. teterellus* Zinck. Newark, light, VII, VIII, IX (Wdt), Jersey City Hts., VI, 20 (Sb), New Brunswick, VII, 1, to IX, 18, Anglesea, VI, 20.
- C. decorellus* Zinck. Montclair, VI, VIII (Wdt), Anglesea, VIII, 21.
- C. mutabilis* Clem. Newark, VII (Wdt), Elizabeth, VIII, 10 (Kp), Anglesea, VI (Lt, Sm).
- C. trisectus* Wlk. North Jersey (Sb), Burlington Co. (Lt), New Brunswick, VII, VIII, Anglesea, VI, VIII, IX, common.
- C. caliginosellus* Clem. Anglesea, VII, 10 (Lt, Sm), New Brunswick, VII.

This is another of the root web-worms common in South Jersey and injurious to corn early in the season.

- C. zeellus* Fern. This species will probably be found with us, though I have no examples as yet: the larva attacks corn.
- C. luteolellus* Clem. Bloomfield, VII, rare (Wdt), New Brunswick.

THAUMATOPSIS Morr.

- T. edonis* Grt. Newark, light, VIII (Wdt), Clementon, IX, 9 (Lt).

ARGYRIA Hbn.

- A. nivalis* Dru. Common throughout the State in low meadows; excessively abundant in late summer at Anglesea.
- A. argentana* Martyn = *nummulalis* Hbn. Shark River (Bt), Anglesea, IX.
- A. auratella* Clem. = *pulchella* Wlk. Newark, VII (Wdt), Elizabeth, VII, 24 (Kp).

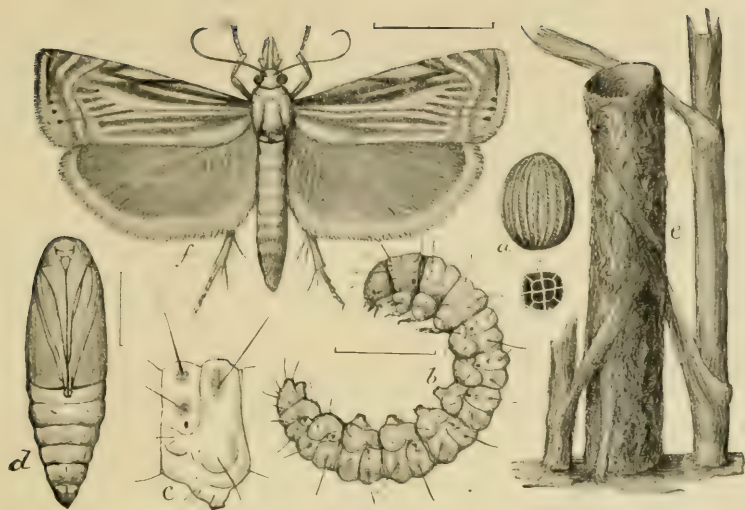


Fig. 211.



Fig. 210.

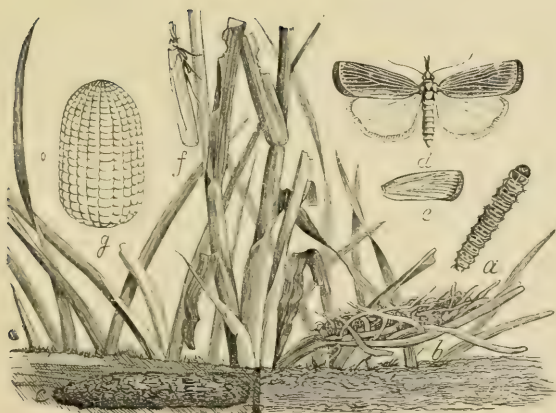


Fig. 213.



Fig. 212.

Fig. 210.—*Evergestis rimosalis*; a, larva; b, pupa; c, adult.

Fig. 211.—Cranberry girdle-worm, *Crambus hortuellus*; a, egg; b, larva; c, a single segment; a pupa; e, tube made by larva; f, adult; all much enlarged.

Fig. 212.—Corn-root web-worm at work.

Fig. 213.—Root web worm, *Crambus vulvivagellus*; a, larva; b, over c, under ground tube and cocoon; d, e, f, moths, wings spread and at rest; g, egg very greatly enlarged.

DIATRÆA Guild.

D. idalis Fern. Newark, Anglesea, IX, common at light.

CHILO Zinck.

C. squamulellus Zell. Anglesea, VII, 9, 10 (Lt, Sm).

Family PTEROPHORIDÆ.

TRICHOPTILUS Wlsm.

T. lobidactylus Fitch. Sure to occur in New Jersey: the larva on golden rod (*Solidago canadensis*).

OXYPTILUS Zell.

O. periscelidactylus Fitch. The "Grape Plume" moth; common throughout the State, the larvæ webbing up the tips of the vines early in spring.

O. delawaricus Zell. Ranges from Massachusetts to California and certain to be found with us.

O. tenuidactylus Fitch. = *nigrociliatus* Zell. New Jersey rare (Bt).

PLATYPTILIA Ebn.

P. carduidactyla Riley. Have seen the larva on thistle, but have not actually taken the adults.

P. marginidactyla Fitch. = *bischoffii* Zell. New Jersey (Bt): food yarrow (*Achillea millefolium*).

PTEROPHORUS Geoff.

P. elliottii Fern. Newark, VII, 2 (Wdt): larva on *Epilobium* (Dyar).

P. subochraceus Wlsm. Anglesea, VI, 20 (Sm), Elizabeth, VI, 4 (Wdt).

P. paleaceus Zell. Newark, VIII, at light, Hemlock falls, VIII, 27 (Wdt).

P. kellicottii Fish. Anglesea, VII, 29 (Lt): larva on golden rod (*Solidago*).



Fig. 214.—The grape plume, *Oxyptilus periscelidactylus*: *a*, larvæ in web; *b*, pupa; *c*, its "breast bone," enlarged; *d*, moth; *e*, segment of larva, enlarged.

P. monodactylus Linn. New Jersey, common (Bt), Hemlock falls, VIII, 27 (Wdt), larva on *Convolvulus* *Chenopodium* and *Atriplex*.

P. homodactylus Wlk. Jersey City Hts., VI, 7 (Sb).

P. eupatorii Fern. Must occur in N. J.; larva on *Epilobium* (Dyar), also on *Eupatorium* (Fernald).

End of Pyralidoidea.

Family THYRIDÆ.

Small but stoutly built species with small, short, more or less angulated wings which are black or brown in color, with white or yellow semi-transparent spots. The antennæ are strictly thread-like or a little thickened in the middle, and the insects have the habit of flying about bare or sandy places, quite early in spring. Very little is known of the early stages save that they are not injurious.

THYRIS III.

T. maculata Harr. Caldwell (Cr), Anglesea, common (Lt), Jamesburg, New Brunswick.

T. lugubris Bdv. Staten Island, VI, New Foundland, VII (Ds), Morris Plains (Neum), Anglesea, rare (Lt), Clementon, V, 10 (Ju), Jamesburg, V, 23, Lahaway, VI, 1.

PLATYTHYRIS G. and R.

P. oculatana Clem. Delaware Water Gap (Pm).

Family SESIIDÆ.

Species of moderate or rather small size, often quite stoutly built, the wings narrow and as a rule at least one pair in great part transparent or without scales. Quite a number have both pairs practically without scales, and, as they are usually more or less black, banded with yellow, they closely resemble wasps or hornets. The antennæ are usually spindle shaped and have a little tuft of hair on the tips. In the male they are often pectinated.

The larvæ are borers without exception, living in the stems, trunks, roots or branches of living trees, sometimes causing serious mischief.

In this family the list has been looked over by Mr. Beutenmuller, who has made it a special study.

MELITTIA Hbn.

M. satyriniformis Hbn. = *ceto* West. Common from July to September wherever squashes or other cucurbits are grown; the larva being the well-known squash borer. I have myself taken the species in Hudson, Union,

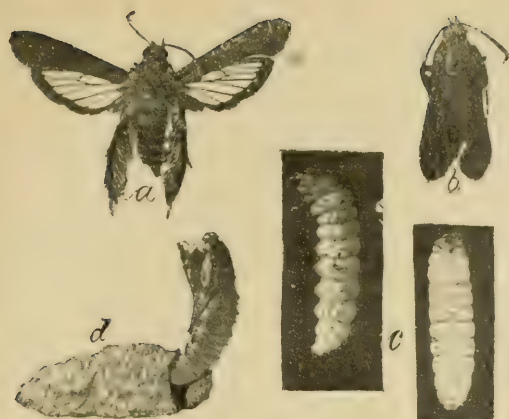


Fig. 216.

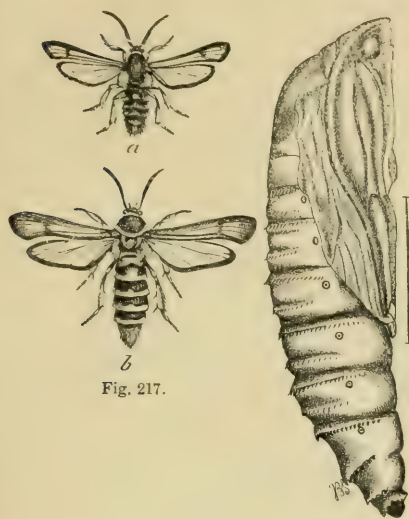


Fig. 217.

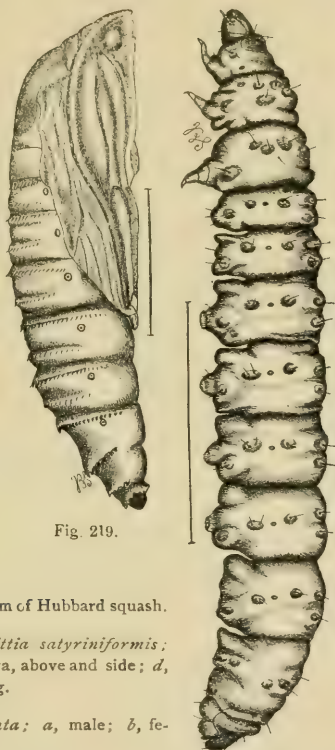


Fig. 219.

Fig. 215.—Squash borers in stem of Hubbard squash.



Fig. 215.

Fig. 216.—Squash borer, *Melittia satyriniformis*; *a*, moth; *b*, same at rest; *c*, larva, above and side; *d*, cocoon with pupa shell projecting.

Fig. 217.—*Bembecia marginata*; *a*, male; *b*, female.

Fig. 218.—Peach borer, much enlarged.

Fig. 219.—Pupa of peach borer, enlarged.

Fig. 220.—The maple borer, *Sesia acerni*; *a*, *a*, larvæ; *b*, *b*, *b*, cocoons in cavities made by larvæ; *c*, moth; *d*, pupa shell from which moth has issued.

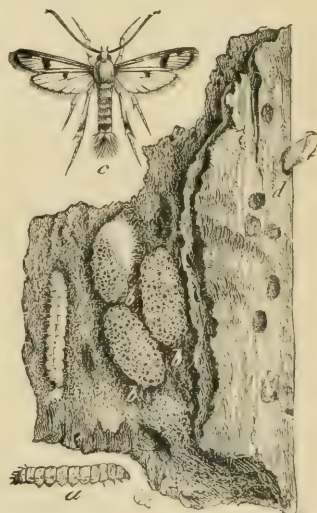


Fig. 220.

Middlesex, Monmouth, Mercer, Burlington, Ocean, Atlantic, Cumberland, Gloucester and Salem Counties. It is recorded also from Staten Island, and has been complained of from Essex and Bergen Counties. I have no doubt it occurs throughout the State. Borers should be cut out or bisulphide of carbon injected into the stem above the crown. Summer squashes can be planted early to attract the moths and save the late varieties.

ALCATHOE Hy. Edw.

- A. caudatum* Harr. Caldwell, rare Orange Mts., VIII (Wdt). The larva bores into the roots of Clematis, and the insect will occur wherever this plant grows.

TROCHILIUM Scop.

- T. apiforme* Linn. Newark, rare (Soc). The larva bores in the roots and lower part of the trunks of poplar and willows.

PARHARMONIA Neum.

- P. fraxini* Hy. Edw. New Jersey (Bt) ; the larva in ash.

BEMBECIA Hbn.

- B. marginata* Harr. Generally distributed, but hardly common ; Pottersville, VIII, 30 (Sb), Staten Island, VI (Ds), Hammonton, IX. The larva is the blackberry crown-borer, which is sometimes locally injurious. I have seen it in Atlantic, Cumberland and Burlington counties, and have no doubt it occurs wherever blackberry or raspberry vines grow.

SCIAPTERON Stgr.

- S. simulans* Grt. Certain to be found in New Jersey, because "I have found empty pupa cases sticking out of oak trees, and so far as we know there is no other large species which inhabits the oak " (Bt).
- S. tricineta* Harr. Will undoubtedly be taken in New Jersey if searched for (Bt). The larva bores in willow and poplar, and the insect has been recorded from all sides of the State.
- S. dollii* Neum. Newark (Ang) ; locally common on Long Island, and will probably be found at many points in New Jersey if sought for. The larva bores in the trunks of young poplars.

TARSA Wlk.

- T. denudata* Harr. Morris Plains (Neum), Newark, V, 18 (Sb), Jamesburg, V, 9. The larva occurs in young shoots of ash.

PODOSESIA Moeschl.

- P. syringæ* Harr. Generally distributed and locally not rare. Newark, in May (Wdt). The larva bores in lilac, ash, mountain ash and pear.

SANNINOIDEA Beut.

- S. exitiosa* Say. Common from June to September wherever peach is grown. The larva is the common peach borer and seriously injurious in many localities. Trees should be protected from June to September by wire netting, newspaper, cement wash or other mechanical covering extending from two inches below to eighteen inches above the surface. The variety *edwardsii* Bt., occurs at Westville (Jn).

SESIA Fabr.

- S. pictipes* G. and R. Newark (Soc), Staten Island, VI, VII (Ds), Hammononton, Riverton, New Brunswick, Philadelphia, VI. The larva bores in the trunks and branches of plum, cherry, beach plum and sometimes peach, but rarely does marked injury.
- S. scitula* Harr. New Jersey (Bt). Breeds in and under oak and chestnut bark and in old oak and willow galls.
- S. pyri* Harr. Generally distributed, Newark, VI, New Brunswick, Burlington County. The larva occurs in apple and pear, but is not common and has not been, in my experience, injurious.
- S. acerni* Clem. Staten Island, VI & VII (Ds), Vineland, Bridgeton, Hammononton, Moorestown, Riverton and in other South Jersey towns. The larva bores in maples and sometimes ruins the younger shade trees.
- S. corni* Hy. Edw. Mr. Beutenmuller thinks this is sure to occur in New Jersey. It resembles the preceding and the larva also bores in maple. Mr. Johnson has taken it near Philadelphia.
- S. tipuliformis* Linn. Generally distributed and flies in June and July. The larva is the common currant borer and often does serious injury to the plants. I have seen it in harmful numbers at Irvington, Hilton, New Brunswick and Moorestown.
- S. bolteri* Hy. Edw. Mr. Beutenmuller thinks this is sure to be found in New Jersey if sought for.
- S. albicornis* Hy. Edw. Morris Plains (Neum), Newark, VI (Wdt). Larva breeds in willows.
- S. bassiformis* Wlk. Merchantville, VIII, 27 (Kp).

CARMENTA Hy. Edw.

- C. pyralidiformis* Wlk. Collingwood, VIII, 16 (Kp). The larva bores in the twigs of beach plum, and the insect is likely to occur throughout Southern New Jersey and along the shore.

 Super-family TINEOIDEA.

These are all small or very small species with narrow, often lanceolate, wings, usually with very long fringes, especially on the secondaries. The antennæ are usually slender, moderate in length, but sometimes very long, the head often



Fig. 221.—Peach borer *Sanninoidea exitiosa* : male above, female below ; much enlarged.

set with closely-placed upright scales which look like a little plush cap. There are exceptions to this type, and some of the species are large and shaggy, as the *Anaphorini*, but the rule is as above given. There are several families, but these are distinguished usually on characters that require special knowledge to perceive, and no attempt will be made to define them. Small as the insects are, some of them are very beautiful, and gold and silver scales are lavishly used on a very diminutive scale.

The larvæ are very largely miners in leaves or vegetable tissue generally, though some live in seeds, nuts and even in animal matter. One species has been found in powdered casein, while the habits of the "clothes moths" are well known.

The list in this super-family has been prepared by Dr. Wm. G. Dietz, Hazleton, Penna., from published data or notes and such specimens as were sent him for determination by or through me or other correspondents. The list prepared by Mr. Beutenmuller for the previous edition, being based upon actual captures, has been used in its entirety. For the present arrangement Dr. Dietz is entirely responsible and to him should be credited all except the economic notes not specifically credited to others.

Family GELECHIDÆ.

STENOMA Zell.

S. schlægerti Zell. Common, food wax myrtle (*Myrica*) and oak: Westville, V, Elizabeth, IX, 16 (Kp), North Jersey (Sb).

CRYPTOLECHIA Zell.

C. contrariella Wlk. Not common, New Jersey (Bt).

C. quercicella Clem. Not rare, food oak, aspen, chestnut: May to July, New Jersey (Bt).

C. reflexella Clem. Recorded from New Jersey (Sm).

MACHIMIA Clem.

M. tentoriferella Clem. Common, Elizabeth, IX, 16 (Wdt); larva between spun-together leaves of oak, chestnut, cherry and walnut.

MENESTA Clem.

M. tortriciformella Clem. Recorded from New Jersey (Sm).

EPIGRAPHIA Steph.

E. packardella Clem. Rare, New Jersey (Bt).

DEPRESSARIA Haw.

D. atrodorsella Clem. Not common, food, beggar-tick (*Bidens*) in leaf folded lengthwise: New Jersey (Bt).

- D. hilarella* Zell. Not common, food, locust and *Sanicula*, in leaf folded lengthwise : New Jersey (Bt), Jersey City Hts., IV, 27 (Sb).
D. fulvipennella Clem. Not common, food, golden rod (*Solidago*) in leaf folded lengthwise ; Elizabeth, VIII, 24 (Kp).
D. lecontella Clem. Common in New Jersey (Bt), Newark (Sb).
D. heracliana De G. Common, larva in stems of parsnip and other *Umbelliferae* (Bt) : have seen it frequently in northern New Jersey (Sm).
D. curviliniella Beut. Recorded from near New York (Bt).

GELECHIA Zell.

- G. gallæsolidaginis* Riley. Larva in stems of golden rod (*Solidago*), producing a fusiform swelling : New Jersey (Bt).
G. epigæella Clem. May and June, Clementon, VI (Lt).
G. bicostomaculella Cham. Not common, larva on oak : imago on the trunks of trees, June and July, attracted by light.
G. orella Wlsm. Not rare, early spring in woodlands, eastern part of the State : Eagle Rock, VII, (Wdt).
G. gallægenitella Clem. Manayunk, Pa. (Lt).
G. discocella Cham. Not common, electric light, June and July.
G. inscripta Wlsm. New Brunswick, IV, rare (Sm), Newark, V, 13 (Wdt).
G. basifasciella Zell. Rare, Orange Mts., in May (Wdt).
G. querciella Cham. Common, larva on oak, New Jersey (Bt).
G. triocella Cham. A very close variety taken at Mt. Airey, Pa.
G. n. sp. Dietz dixit. Cape May Co. (Lt).
G. vagella Wlk. Hemlock falls, VIII, 23 (Wdt).

TACHYPTILIA Hein.

- T. agrimoniella* Clem. Not common ; food *Agrimonia eupatoria* : Hemlock falls, IX, 3. Woodside, VI, 14 (Wdt).
T. rhoifruetella Clem. Larva on sumach (*Rhus typhina*), in fruit racemes ; also on poplar (Bt) : Newark, V (Wdt).

STROBISIA Clem.

- S. emblemella* Clem. Scarce in New Jersey (Bt).
S. levipedella Clem. Rare in New Jersey (Bt).
S. iridipennella Clem. Rare ; recorded from eastern Pennsylvania.

MALACOTRICHIA Zell.

- M. bilobella* Zell. Rare ; August among scrub oak.

TRICHOTAPHE Clem.

- T. alacella* Clem. Not common in New Jersey (Bt).

T. juncidella Clem. Not common ; New Brunswick (Sm).

T. flavicostella Clem. Not common, June, electric light : Elizabeth, VII, 12 (Wdt).

ARISTOTELIA Hbn.

A. dorsivitella Zell. Jamesburg, III (Sm).

A. roseosuffusella Clem. Not rare : June, July, attracted to light : larva mines the leaves of red clover (*Trifolium pratense*) (Chambers) : in fruit panicles of sumach (Packard).

A. intermediella Cham. Common at electric light, June and July.

A. rubidella Clem. Not common in N. J. (Bt).

A. pinifoliella Cham. Jamesburg, common in *Pinus rigida* (Sm), June, electric light.

A. attributella Wlk. Common, June to August, electric light : Forest Hill, VII (Wdt).

ANACAMPSIS Curt.

A. apicistrigella Cham. Not rare, June and July among scrub oak and at electric light : Bloomfield, VII (Wdt).

A. absconditella Wlk. Very common, VII and VIII, at electric light.

POLYHYMNO Cham.

P. luteostrigella Cham. Rare, Anglesea, VIII, 21 (Lt).

YPSOLOPHUS Fabr.

Y. pometellus Haw. Common, larva on apple, pear and plum : Hemlock falls, VIII, 27, Orange Mts., VI (Wdt).

Y. punctidiscellus Clem. Rare, June, east Pennsylvania.

Y. bipunctellus Wlsm. Rather rare, April among scrub oak.

Y. roseocostellus Wlsm. Not common ; larva on poplar.

ANARSIA Zell.

A. lineatella Zell. Larva in woody excrescences of plum, peach and apple ; also in stems of strawberry : Trenton (U. S. Ag), larval work noted at various points in the State, but not injurious (Sm).

ANORTHOSIA Clem.

A. punctipennella Clem. Rare, July, electric light and borders of woodlands.

SITOTROGA Hein.

S. cereallella Oliv. This is the "Angoumois grain moth," the larva of which is sometimes very injurious to grain in the mow or corn in the crib, boring into and eating out the kernels. It is not equally abundant every

year, and usually does only a little harm; but in 1898 it damaged stored grain fully one-half in many parts of Southern New Jersey (Sm). The remedy is a free use of bisulphide of carbon in an infested bin, and to prevent infestation, prompt threshing and bulking the product.

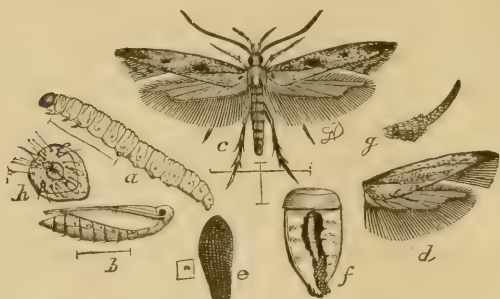


Fig. 222.—Angoumois grain moth: *a*, larva; *b*, pupa; *c*, moth; *d*, wings of a variety; *e*, egg; *f*, larva feeding in kernel of corn; all save *f* greatly enlarged.

Family ŒCOPHORIDÆ.

BLASTOBASIS Zell.

- B. chalcfrontella* Clem. Not rare at electric light, VI, VII.
B. glandulella Riley. Generally distributed, (VII-IX), larva in acorns: Newark, VII, at light (Wdt).
B. purpurocomella Clem. Very common at electric light, V-IX.
B. modestella Clem. Recorded from New Jersey (Sm).

DASYCERA Haw.

- D. newmanella* Clem. Rare in New Jersey (Bt).

ŒCOPHORA Zell.

- Œ. argenticinctella* Clem. Common in New Jersey (Bt).

HAMADRYAS Clem.

- H. bassettella* Clem. Jamesburg, in July (Sm).

ŒGOCONIA Steph.

- Œ. quadripuncta* Hw. Mt. Airey, Pa. (Lt).

Family ELACHISTIDÆ.**ENDROSIS** Hbn.

E. lacteella Schiff. New Brunswick, IX, 24 (Sm).

SCYTHRIS Hbn.=**BUTALIS** Tr.

S. impositellus Zell. Common; larva on asters (Bt).

S. eboracensis Zell. Jamesburg, VI, 10 (Sm).

S. flavifrontella Clem. = *basilaris* Zell. New Brunswick, VI, 28 (Sm), Anglesea, VII, 24 (Lt).

PIGRITIA Clem.

P. laticapitella Clem. Anglesea, V, 30 (Sm), VIII, 21 (Lt).

P. ochreella Clem. Generally distributed (Clemens).

P. ochreocomella Clem. Not common, Anglesea, VIII, 21 (Sm).

SCHRECKENSTEINIA Hbn.

S. erythriella Clem. Not rare, June to August; larva on fruit racemes of sumach (Clemens).

LAVERNA Curt.

L. eloisella Clem. Generally distributed, Anglesea, VI, 20 (Sm), Woodside, VI, 14 (Wdt); larva in stalks of evening primrose (Bt).

L. circumscriptella Zell. Rare, Anglesea, VIII, 30.

L. rufocristatella Cham. Rare, Anglesea, VII, 30.

L. luciferella Clem. Eastern Pennsylvania.

L. definitella Zell. New Jersey, VIII, 24 (Lt).

LIMNÆCIA Stph.

L. phragmitella Stph. Orange Mts., VII (Wdt), common at light in Newark: in Europe the larva lives in *Typha* (Sm).

COSMOPTERYX Hbn.

C. gemmiferella Clem. Rare in New Jersey (Bt).

C. clemensella Stph. Anglesea (Lt); a varietal form.

ANTISPILA H-Sch.

A. nyssæfoliella Clem. Very common; larva mines the leaves of *Nyssa multiflora* in September. I have counted as many as twelve mines in a single leaf.

A. viticordifoliella Clem. Not rare; larva makes an orange colored blotch mine on the leaves of wild grape (*Vitis cordifolia*) in August.

A. isabella Clem. Rare; larva mines the leaves of the Isabella grape in September.

ASPIDISCA Clem.

A. splendoriferella Clem. Common; larva mines the leaves of *Cratægus tomentosa* (Clem) and apple (Bt).

A. lucifuella Clem. Larva mines the leaves of hickory, IX and X.

ELACHISTA Tr.

E. præmaturella Clem. Early in April (Clem).

E. brachyelytrifoliella Clem. Larva mines the leaves of *Brachyelytrum aristatum*, early in July (Clem).

COLEOPHORA Zell.

C. malivorella Riley. Common, larva on apple, plum and cherry.

C. cratipennella Clem. Not common, at electric light, May, June (Dtz), Hemlock falls, VIII, 30 (Wdt).

C. fabriciella Zell. = *corruscipennella* Clem. Generally distributed, not rare; Newark (Dn).

C. cretaticostella Clem. Rare, at electric light, June and July.

C. leucochrysella Clem. In July (Clem).

C. concolorella Clem. June (Clem).

C. rosæfoliella Clem. Larva on leaves of garden rose (*Rosa centifolia*).

C. rosacella Clem. Larva on opening buds of sweet brier (*Rosa rubiginosa*).

Family PLUTELLIDÆ.

PLUTELLA Schr.

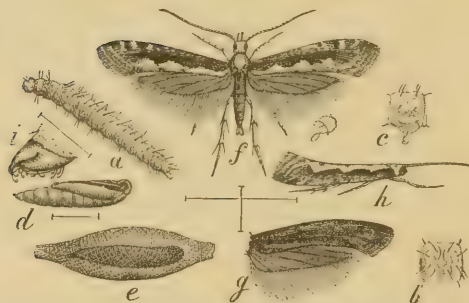


Fig. 223.—Cabbage Plutella, *P. cruciferarum*: *a*, larva; *b*, *c*, segments of same; *d*, pupa; *e*, same in its cocoon; *f*, adult; *g*, wings of a variety: all enlarged.

P. cruciferarum Zell. Common, generally distributed, larva on cabbage and other cruciferæ; but thus far not notably injurious in New Jersey: Anglesea, VII, 24 (Lt, Sm), North Jersey (Sb).

GLYPHIPTERYX Hbn.

G. impigritella Clem. Rather rare, in damp places, latter part of May to end of July.

CHOREUTIS Hbn.

C. pavonicella Clem. Rare in New Jersey (Bt).

C. virginella Clem. Near New York (Bt).

C. inflatella Clem. In July (Clem).

HYPONOMEUTA Zell.

H. multipunctella Clem. Not common: June and July, at light.

Family TINEIDÆ.**Sub-family ADELINÆ.****ADELA** Latr.

A. ridingsella Clem. Eastern Pennsylvania.

A. purpura Wlk. Little Falls, IV, 24, on blossoms of pussy willows (Kp).

Sub-family ANOPHORINÆ.

These are large, roughly scaled moths, moderate or large in size, often with long curved palpi, some of them tufted. They are the exception in this series.

ACROLOPHUS Poey.

A. plumifrontellus Clem. Common, Newark, VII (Wdt), Jersey City Hts., VII, 4 (Sb), Anglesea, VI and VII.

ANOPHORA Clem.

A. propinqua Wlsm. A specimen collected by Prof. J. B. Smith at Anglesea (in July), I refer to this species; but its expansion is greater than that given by Lord Walsingham.

PSEUDANOPHORA Wlsm.

P. arcanella Clem. Common; Newark, VII, at light (Wdt), Anglesea in July.

Sub-family TINEINÆ.**XYLESTHIA** Clem.

X. pruniramiella Clem. Not common, though generally distributed: Anglesea V and VIII, West Orange, VII (Wdt): larva in woody excrescences on plum trees.

X. clemensella Cham. Anglesea, VII, 10 (Lt).

AMYDRIA Clem.

A. efrenatella Clem. Not common, at light in April and July : Newark, VII (Wdt).

SCARDIA Tr.

S. anatomella Grt. Very rare ; Lahaway, bred from fungous growths on oak (Sm).

TINEA Linn.

T. pellionella Linn. Generally distributed ; larva destructive to furs and woolen fabrics. It is one of the common clothes moths or "millers" found in houses. A free use of naphthaline is advised as a repellant as well as care and cleanliness in storing material during summer.

T. granella Linn. Common, larva in grain ; especially corn.

T. aurosuffusella Cham. At electric light in June.

T. bimaculella Cham. Rare, June and July, at electric light.

T. carnariella Clem. Not rare in houses.

T. fuscipunctella Haw. Common, generally distributed.

BLABOPHANES Zell.

B. ferruginella Hbn. Common everywhere, Anglesea, VII, 24 (Lt), Newark, IX (Wdt).

B. dorsistrigella Clem. Common in New Jersey (Bt).

TINEOLA H. S.

T. biselliella Hum. Common everywhere : larva destructive to furs and woollens. Perhaps the most common of our house or clothes "moths."

HOMOSETIA Clem.

H. costosignella Clem. Rare, eastern part of the State : Forest Hill, VII (Wdt).

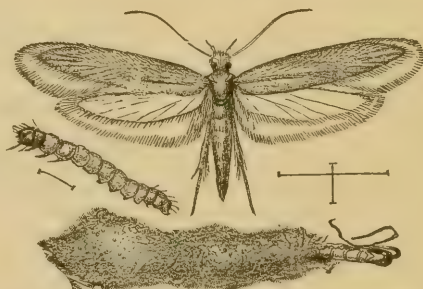


Fig. 224.—Common clothes moth, *Tineola biselliella* : larva ; case with empty pupa shell, and moth : all enlarged.

INCURVARIA Hein.

I. acerifoliella Fitch. South River, V, 26 ; larva in blotch mine on leaf of maple.

I. mediostriata Clem. Rare, in damp situations in July.

HYBROMA Clem.

H. servulella Clem. Scarce, Forest Hill, VII (Wdt).

TENAGA Clem.

T. pomiliella Clem. Eastern Pennsylvania in July (Clem).

Sub-family PRODOXINÆ.

PRONUBA Riley.

P. yuccasella Riley. Common, larva in the seed pods of *Yucca*; abundant at Bridgeton in 1897 (Sm).

Sub-family ARGYRESTHINÆ.

ARGYRESTHIA Hbn.

A. andereggiella F. and R. June and July, larva in buds of hazel and apple.

A. austerella Zell. Common, imago on the trunks of oak and chestnut, June and July: larva probably feeds on lichens.

Sub-family GRACILARIINÆ.

GRACILARIA Zell.

G. sassafrasella Cham. Common; larva on sassafras, in leaf rolled downward (Bt).

G. swederella Thunb. Common; larva on maple (*Acer rubrum*); rolls end of leaf into a cone.

G. burgessiella Zell. Not rare, May and June: I have bred it from swamp huckleberry (*Vaccinium corymbosum*).

G. belfrageiella Cham. Mt. Airey, Pa., July (Lt).

PARECTOPA Clem.

P. lespedezæfoliella Clem. Larva mines the leaves of bush clover (*Lespedeza violacea*).

P. robiniella Clem. Common, larva forms a digitate blotch mine on the upper surface of the leaves of Locust (*Robinia pseudacacia*).

ORNYX Zell.

O. cratægifoliella Clem. Not rare; larva mines the leaf of black thorn (*Cratægus tomentosa*).

Sub-family LITHOCOLLETINÆ.

BEDELLIA Steph.

B. somnulentella Zell. Common, larva makes a large blotch mine on the leaves of morning glory *Ipomea purpurea* in September; at times feeds externally: imago in October, and is probably double-brooded.

TISCHERIA Zell.

T. citrinipennella Clem. Common, larva on oak: imago, VI and VII.

T. solidaginifoliella Clem. Larva on golden-rod.

T. ænea F. and R. Very common, larva forms a funnel-shaped blotch mine in the leaves of the common blackberry (*Rubus villosus*): imago in August.

T. malifoliella Clem. Larva forms a yellowish brown blotch mine in the leaf of apple in September; imago appears in May of the following year.

LITHOCOLLETES Zell.

L. aceriella Clem. Common; larva makes a broad tract-mine in maple leaf, VII and IX: imago in May.

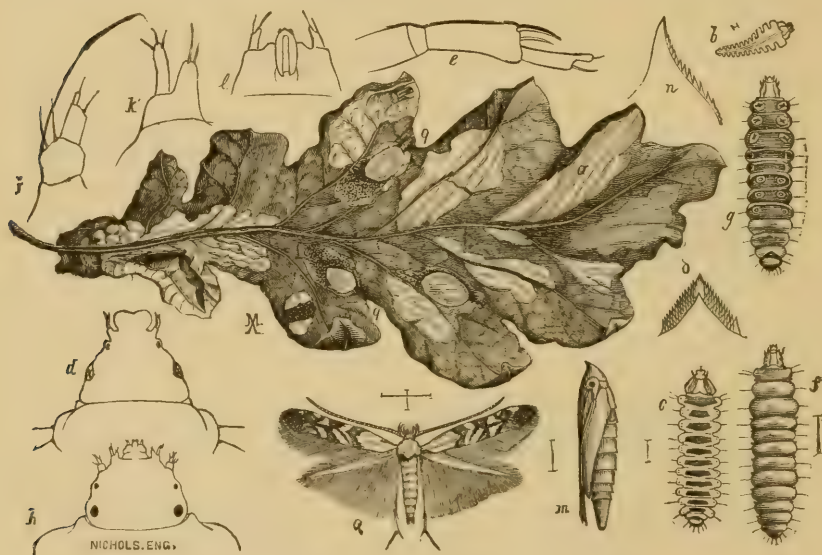


Fig. 225.—*Lithocolletes hamadryadella* and the work of its larva on an oak leaf; *q*, moth; *m*, pupa; *c*, *f*, *g*, larvæ: all enlarged. The other figures are of structural details.

L. hamadryadella Clem. Very common: larva on oak, making a large, whitish, blotch-mine.

- L. fitchella* Clem. Not common: larva on oak, mining the underside of leaves (Bt).
- L. robiniella* Clem. Very common: larva mines the leaf of locust (*Robinia pseudacacia*) September to middle of October.
- L. caryæfoliella* Clem. Common: larva mines the upper side of the leaves of hickory, VI, VII and IX (Clem).
- L. guttifinitella* Clem. Very common: larva mines the leaf of poison ivy (*Rhus radicans*) August and September.
- L. desmodiella* Clem. Larva mines the under surface of leaf of *Desmodium viridiflorum*.
- L. tubiferella* Clem. Rare: larva mines the upper surface of the leaves of oak (Clem).
- L. cratægella* Clem. Not common: larva on black thorn (*Cratægus tomentosus*), apple and wild cherry (Clem).
- L. basistrigella* Clem. Not rare: larva mines the underside of the leaf of oak, particularly *Quercus castanea*, August and September.
- L. argentifimbriella* Clem. Less common, but generally distributed: larva on oak.
- L. obscuricostella* Clem. Larva mines the leaf of *Ostrya virginica* in September (Clem).
- L. lucetiella* Clem. Larva mines the underside of leaf of basswood (Clem).
- L. obstrictella* Clem. Rather common; larva mines the underside of oak leaf.
- L. æriferella* Clem. Not common; larva on oak, September and early October (Clem).
- L. lucidicostella* Clem. Scarce; the larva mines the underside of maple leaf.
- L. ostryæfoliella* Clem. Larva mines the underside of the leaves of *Ostrya virginica* (Clem).
- L. populiella* Cham. Not common, larva in a small web mine on the underside of aspen leaf, in September: imago, end of September or beginning of October.

LEUCANTHIZA Clem.

- L. ampicarpæfoliella* Clem. Common; larva on hog-peanut *Amphicarpa monoica* (Clem).

Sub-family LYONETINÆ.

LYONETIA Hbn.

- L. speculella* Clem. Eastern Pennsylvania in August (Clem).

PHYLLOCNISTIS Zell.

- P. erechthisella* Cham. Common, larva makes a line or tract mine in the leaves of fireweed (*Erechtitis hieracifolia*) in August : imago, latter part of August and September.
- P. vitigenella* Clem. Common ; larva makes a tract mine in the leaf of the Grape.

BUCCULATRIX Zell.

- B. pomifoliella* Clem. Larva feeds externally on leaf of apple in September.
- B. agnella* Clem. About the middle of May (Clem).
- B. trifasciella* Clem. Larva on chestnut.
- B. quinquenotella* Cham. Not rare, in June.

Sub-family NEPTICULINÆ.

NEPTICULA Zell.

- N. fuscotibiella* Clem. At light, August (Clem) : larva on willow.
- N. bifasciella* Clem. At light, August (Clem).
- N. platanella* Clem. Eastern Pennsylvania in July.
- N. nyssæella* Clem. Larva makes a line or mine on upper surface of leaves of *Nyssa multiflora* : imago the following April.
End of Tineoidea.

 Family COCHLIDIIDÆ.

These are moderate-sized or small moths with rather plump and shaggy bodies, retracted head, weak tongue, and often pectinated antennæ. The wings are short and broad, often very densely scaled, the colors usually brown, often with green contrasts.

The larvæ are rather more easily recognized than the adults, from their slug-like character. The feet are in large part obsolete, while the underside is flattened, soft and fleshy, the larva using the entire under surface in walking. Another peculiarity is found in the poisonous character of the spines clothing these caterpillars, the tips being very finely pointed, easily detachable and extremely irritating when they are imbedded in the flesh. In some cases they cause serious swellings.

Dr. Dyar says concerning these larvæ that most of them are feeders on any smooth-leaved tree, and this may be assumed unless special food plants are mentioned or unless cultivated species are injuriously affected.

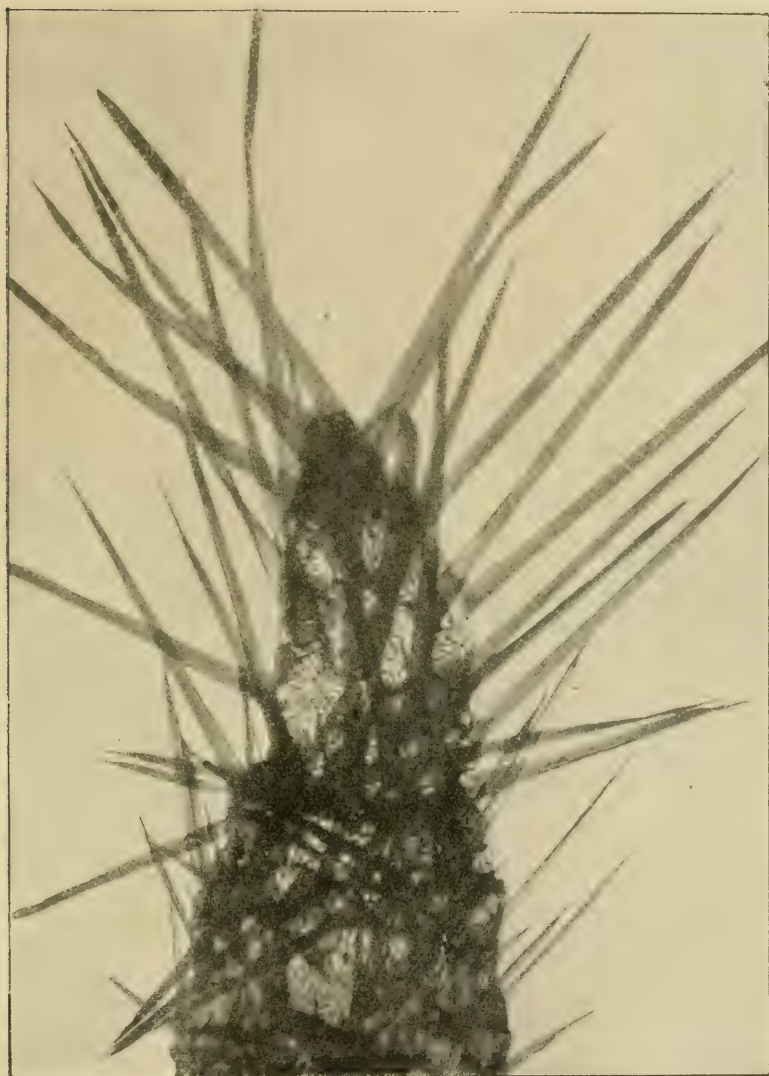


Fig. 226.—Poisonous spines of the saddleback caterpillar.

SIBINE H. S.

S. stimulea Clem. Saddleback caterpillar. G. d., locally common in July. The larva occurs in late summer on pear, cherry and apple, sometimes partially defoliating young trees; it also feeds on a large variety of other plants. It succumbs very readily to arsenical sprays.

EUCLEA Hbn.

E. delphinii Bdv. Occurs throughout the State. The moth flies in June and July, the larva is found, sometimes commonly, in late summer on pear, cherry, oak, chestnut, blackberry and a variety of other trees and shrubs. Five varieties based on color differences have been recognized, and all occur in the State: they are *querceti* H. S., *interjecta*, Dyar, *viridiclava* Wlk., *elliottii* Pears., and *pænulata* Clem.

E. indetermina Bdv. = *chloris* ‡ Auct. Quite generally, but irregularly distributed; imago June to August, larva until November, Caldwell (Cr), Newark, VI, 22 (Sb), Ft. Lee (Dyar), Staten Island (Ds), Anglesea (Lt). Food plants are apple, cherry, rose and a great variety of other trees and plants.

E. chloris H. S. = *fraterna* Grt. Everywhere common (Dyar), Hopatcong (Pm), New Brunswick, Jamesburg, Anglesea. The moth flies in July, the larvæ are found August and September on cherry, oak, hickory and other trees and shrubs.

MONOLEUCA G. and R.

M. semifascia Wlk, Morris Plains (Neum): Mr. Beutenmuller records it as rare near New York, and adds that the caterpillar is unknown.

ADONETA Clem.

A. spinuloides H. S. Recorded from Jersey City and Newark (Soc) to Anglesea (Lt) and will probably be found throughout the State. The moth flies in July and the larva feeds in late summer on plum, cherry, birch, bayberry and other trees and plants.

A. leucosigma Pack. Occurs rarely with the preceding of which, Dr. Dyar suggests, it is probably a variety.



Fig. 227.—The saddleback caterpillar.



Fig. 228.—*Sibine stimulea*: parent of the saddleback caterpillar.

SISYROSEA Grt.

S. textula H. S. = *inornata* G. and R. Newark (Soc), Ft. Lee (Bt), common everywhere (Dyar). The moth flies in July; larva, VIII and IX, on plum, cherry, oak, bayberry and other trees and plants.

NATADA Wlk.

N. nasoni Grt. Plainfield (Doll) and will undoubtedly occur elsewhere in the State: it seems to be very local; but, according to Beutenmuller, is sometimes common where it occurs. The larvæ feed on oak, chestnut, beech, &c.

PHOBETRON Hbn.

P. pithecius S. and A. The hag-moth. Flies in July, generally distributed, but rare. The remarkable caterpillar is quite a general feeder and has been sent in from a variety of the ordinary orchard trees.

PROLIMACODES Schaus.

P. scapha Harr. Rather common throughout the State; but sometimes local. The moth flies VII and VIII, the larvæ may be found until November (Bt), feeding on a great variety of trees and plants, including apple, pear, cherry and plum.

COCHLIDION Hbn.

C. biguttata Pack. Hopatcong, VI and VII (Bt), Newark (Soc), Staten Island, VII (Ds), Woodbury, VI, 18 (Kp), Anglesea (Lt). The larva seems confined to oak.

C. y-inversa Pack. Hopatcong, VII (Bt), Newark (Soc), generally distributed, but local and not common. The larva on hickory and blue beech (Dyar).

C. rectilinea G. and R. Morris Plains (Bt), and northern New Jersey (Sm). According to Beutenmuller, the larva is unknown.

LITHACODES Pack.

L. fasciola H. S. Quite generally distributed and not rare in July; Caldwell (Cr), Newark (Soc), Staten Island (Ds), New Brunswick. The larva is a general feeder, including in its *menu* apple, cherry, huckleberry, bayberry, maple, oak, linden, hickory, etc. The variety *lati-clavia* Clem., occurs with the type but is less common.

TORTRICIDIA Pack.

T. flexuosa Grt. Local in the Jersey City and Newark district, June and July: Morris Plains, rare, scattered (Dyar), Ft. Lee (Bt). The larva feeds on cherry, plum, apple, oak, chestnut, hickory, etc. The variety *caesonja* Grt., occurs with the type.

- T. pallida* H. S. Morris Plains, g. d. (Dyar), Ft. Lee (Bt), Staten Island (Ds). The moths fly in June; the larvæ occur on willow, oak, sycamore, bayberry, etc. A variety, *flavula* H. S., occurs with the type.
- T. testacea* Pack. G. d., and locally not rare; Newark (Soc), Ft. Lee (Bt). Adult flies in July, the larva on oak, wild cherry, birch, &c., &c.

HETEROGENEA Knoch.

- H. shurtleffei* Pack. Ft. Lee, VII (Bt): larva on oak, chestnut and beech.

PACKARDIA G. and R.

- P. geminata* Pack. Newark (Soc), g. d., but rare: flies in June, the larva on wild cherry, birch, oak, etc., etc. The varieties *albipuncta* Pack., *ocellata* Grt., and *goodellii* Grt., are found with the type.
- P. elegans* Pack. = *nigropunctata* Good. Newark (Soc), Hopatcong, VII (Bt), Morris Plains (Dyar). The larva feeds on cherry, maple, linden and other shade and forest trees. A variety *fusca* Pack., occurs with the type.

Family MEGALOPYGIDÆ.

Medium sized or rather large moths with plump very hairy body, the abdomen squarely truncated, antennæ lengthily pectinated in the male. The wings are short, broad and obtuse, also clothed with long hair forming a surface which Prof. Comstock compares with flannel; and, because of the wavy lines on the forewings, he calls our common species the "crinkled flannel moth." The larvæ seem to have an extra pair of abdominal legs and the cocoon is a curious case-like structure which has a trap door at one end.

MEGALOPYGÆ Hbn. = LAGOA Harr.

- M. crispata* Pack. Quite generally distributed, the imago in June and August. The larva feeds on most of the orchard and small fruits and on many other trees and shrubs as well; but is not abundant enough at any time to be harmful.
- M. opercularis* S. and A. Should occur in the State.

Family PYROMORPHIDÆ.

Small moths, black or smoky-brown in color, rather broad-winged in one case, narrowly rounded in the others, collar nearly always red. The species

are slight, rather frail in appearance and have two inner veins on primaries and three on the secondaries. The antennæ in the male are pectinated.

PYROMORPHA H. S.

P. dimidiata H. S. Staten Island, VI, (Ds), Lahaway, VI. The larva feeds on dead oak leaves.

ACOLOITHUS Clem.

A. falsarius Clem. Anglesea, V, 30, on flowers of beach plum (Lt), common on blossoms of wild cherry, and beaten from oak shrubs in June (Sm); signs of larval work at Morris Plains (Dyar). Food plants grape and Virginia creeper.

HARRISINA Pack.

H. americana Harr. Locally common throughout the State and injurious to grape. In the Egg Harbor district the Clevelenoor is the favorite and is often seriously harmed. The moth flies in May, June and July. The larvæ feed in colonies and are easily reached in their young stage by picking off the leaves first infested; later an arsenical spray will prove effective.



Fig. 230.—Grape leaf with larvæ of *Harrisina americana* feeding in characteristic way.

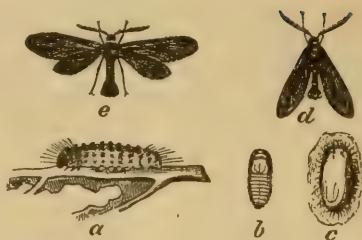


Fig. 229.—*Harrisina americana*; a, larva; b, pupa; c, cocoon; d, e moths, wings closed and open.

Family PSYCHIDÆ.

These are the "bag-worms"; so called because the larvæ make a sac or case of leaves, chips and silk, in which they live, and which they carry about with them. The male moths only are winged, the wings transparent or thinly scaled, black, the body very hairy, abdomen long and slender, antennæ pectinated. The females are grub-like and lay their egg in the sac which they constructed as a larva.

PSYCHE Ochs.

P. confederata Grt. and Rob. Staten Island, VI (Ds), Jersey City Hts. (Sb), Newark (Soc), Ft. Lee (Bt). The larva lives on the bark of oak and chestnut in a little silken case. Mr. Beutenmuller records it as common locally, and adds that it is double-brooded.

THYRIDOPTERYX Steph.

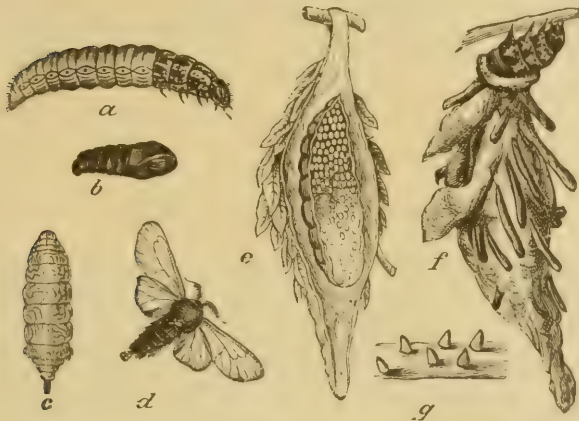


Fig. 231.—Bag-worm, *Thyridopteryx ephemeræformis*: *a*, larva; *b*, male pupa; *c*, adult female; *d*, adult male; *e*, bag cut open to show the egg mass; *f*, bag carried by feeding caterpillar; *g*, young larvæ in their first case.

T. ephemeræformis Steph. The common "bag-worm" or "drop-worm." Occurs throughout the State on a very large variety of fruit and shade trees. It is particularly injurious to *Arbor vitæ* hedges, which are often entirely killed by it. The bags containing eggs hang on the trees all winter, hatch early in the season, and the adults appear in late August and September. Among remedial measures, picking off and destroying all bags that are to be seen in winter takes first rank. If the larvæ are present on arbor vitæ, a strong arsenate of lead mixture should be used to kill them, as this does not endanger the foliage.

Family LACOSOMIDÆ.

This family resembles the preceding in general structure, but has the wings closely scaled and fully developed in both sexes. The larvæ live similarly, but the bag is always open at both ends.

LACOSOMA Grote.

- L. chiridota* Grt. Recorded from the vicinity of New York by Beutenmuller ; the caterpillar feeding on oak in a case open at both ends ; should occur in New Jersey without doubt.

CINCINNUS Blanch. = PEROPHORA Harr.

- C. melsheimeri* Harr. Generally distributed, not common. Newark, VI, 16 (Sb), near New York (Bt), Hopatcong (Pm), Ocean County. The larva feeds in a flattened case open at both ends, on oak and winterberry (Bt) ; the moth occurs in June and July, and has been usually beaten from the trees.

Super-family TORTRICOIDEA.

"The Tortricids are generally small moths, but as a rule they are larger than the Tineids. They have broad front wings which usually end squarely. The costa of the front wing curves forward strongly near the base of the wing ; when at rest the broad front wings fold above the body like a roof. The moths are variegated in color, but are usually brown, gray or golden rather than of brighter hues. As a rule the hind wings are of the color of the body and without markings" (Comstock).

They are sometimes called "bell-moths" because some species with abruptly widened wings greatly resemble in outline a bell.

The larvæ are largely leaf-rollers, living and feeding in concealment, more or less sheltered from either contact or stomach poisons, and this makes them difficult to deal with.

Some of them feed in fruits, and an example of this is found in the codling moth, which infests the apple.

Family TORTRICIDÆ.**TERAS Tr.**

- T. subnivana* Wlk. New York and Pennsylvania.
T. trisignana Robt. Near New York (Bt).
T. scabrana Curt. Woodside, VII (Wdt), Jersey City.
T. hastiana Linn. Newark, III (Wdt), New Brunswick : the variety *maculidorsana* Clem., at Jamesburg, V, 5 : larva feeds on willow.
T. permutana Dup. Not yet actually found in the State, but should occur : the larva is recorded on willow.

T. ferrugana Schiff. New Brunswick, and probably throughout the State : the larva on birch.

T. minuta Rob. Have it from every county in the State : the larva feeds universally on apple, but is also destructive on cranberry bogs where it is known as the "fire worm." There are three broods, the hibernating winter form being slate gray, the summer broods orange. The most satisfactory method of dealing with these insects is to reflow the infested bogs when they have hatched generally. If this is not feasible, hold the water as late as possible to induce oviposition elsewhere.



Fig. 232.—*Teras minuta* : enlarged.

T. oxycoccana Pack. Also a cranberry feeder and may be a form of the preceding.

T. americana Fern. Woodside, VIII, 3 (Wdt).

CACECIA Hbn.

C. rosaceana Harr. Common throughout the State : the larva on orchard and small fruits ; also on roses which are often severely injured. It folds a leaf and on garden plants the larva can be crushed in these leaves.

C. purpurana Clem. Orange Mts., VII (Wdt), New Brunswick, VII, and elsewhere in the State : larva on geranium.

C. rosana Linn. New Brunswick, on currant : the larva also on other orchard and small fruits, as well as on shade trees.

C. cerasivorana Fitch. Generally distributed and not rare : the larva on cherry and white birch.

C. parallela Rob. Burlington Co., bred from larva on cranberry.

C. argyrospila Wlk. Newark, VI and VII (Wdt), and undoubtedly general throughout the State : larva on rose, apple, cherry, oak, hickory, elm, etc.

C. semifera Wlk. Burlington County ; larva on Polygonum.

C. fervidana Clem. Sussex Co. (Lt), Ft. Lee, common (Bt), Newark, light, VIII (Wdt, Sb), Jamesburg, Burlington Co. : larva very common in June, making huge web nests on oak shrubs ; it feeds also on cherry.

C. fractivittana Clem. Found just across the Delaware in Pennsylvania, and very certain to occur with us.

LOXOTÆNIA Steph.

L. afflictana Wlk. Ocean County, several specimens : larva on spruce.

L. virescana Clem. South River, VI, 26.

L. clemensiana Fern. Newark at light, VI, IX (Wdt), common everywhere (Dietz).

PTYCHOLOMA Steph.

P. persicana Fitch. Plainfield (U S Ag), and generally distributed : larva on strawberry and peach.

PROPERTY OF
Z. P. M.

P. melaleucana Wlk. Montclair: the larva on *Trillium* and *Polygonatum*.

PANDEMIS Hbn.

P. lamprosana Rob. Very certain to occur with us.

LOPHODERUS Steph.

L. juglandana Fern. Not uncommon in Ocean County.

L. triferana Wlk. Jersey City Hts., IV, 24 (Sb), New Brunswick, IV, Jamesburg, V, 4: recorded as feeding on cranberry, but I have not yet found the larva on our bogs.

L. velutinana Wlk. Newark, VII (Wdt), Jersey City Hts., IV, 24 (Sb), New Brunswick, IV (Sm), Passaic Co., IV, 19, V, 1 Merchantville, IV, 14 (Kp), Anglesea, IX, 3 (Lt).

L. politana Harr. Monmouth Co., VI, 12 (Sm).

TORTRIX Linn.

T. alleniana Fern. Anglesea, VI, 20.

T. pallorana Rob. Hopatcong (Bt), Orange Mts., VIII, 16 (Kp): larva on cherry and *Verbena*.

T. houstonana Grt. Anglesea; the larva on cedar (Lt).

T. quercifolia Fitch. Newark; the larva on oak near N. Y. (Bt).

T. albicomana Clem. Orange Mts., VI (Wdt), Newark, New Brunswick, Ocean County: larva on oak, rose and *Aquilegia canadensis*.

T. peritana Clem. Anglesea, VIII, 21.

T. alisellana Rob. Newark.

T. fumiferana Clem. Newark, Orange Mts.: larva on spruce.

AMORBIA Clem.

A. humerosana Clem. Newark, VI (Wdt), New Brunswick, Jamesburg: larva on pine, spice-bush and *Rhus toxicodendron*.

CENECTRA Gn.

C. unifasciana Clem. New York and Pennsylvania.

C. xanthoides Wlk. Maine to Virginia.

CENOPIS Zell.

C. reticulatana Clem. Jersey City, Anglesea, VI, IX: larva on rose, geranium, oak, persimmon, pear, maple.

C. cana Rob. New York and Pennsylvania.

DICHELIA Gn.

D. sulfureana Clem. Weehawken (Bt), Orange Mts., VIII (Wdt), Anglesea V, 30, VI, IX: the larva on grape, willow, strawberry and a great variety of other plants.

AMPHISA Curt.

A. discopunctana Clem. Hemlock falls, VI, 23, Woodside, VIII, 26 (Wdt).

CAPUA Steph.

C. furcatana Wlk. Orange, VIII, 16 (Kp).

PLATYNOTA Clem.

P. flavedana Clem. Westville, IV, 12, Anglesea, V, 30; VI, 20.

P. sentana Clem. New Brunswick, Anglesea, VI, 20.

Family CONCHYLIDÆ.**CONCHYLIS** Tr.

C. rutilana Hbn. Hunterdon County: the larva injurious to trailing juniper.

C. dorsimaculana Rob. Newark (Wdt), Middlesex, Monmouth, Ocean and Cape May Counties; common.

C. promptana Rob. Atlantic County.

C. angulatana Rob. Near New York (Bt).

C. argentilimitana Rob. Anglesea, VIII, 21 (Sm), VII, 10, 17, 24 (Lt).

Family GRAPHOLITHIDÆ.**RETINIA** Gn.

R. frustrana Scud. Westville, IV, 27 (Kp), Ocean Co., Riverton, IV, 17: larva on pine.

R. comstockiana Fern. Common in the Central Park, N. Y., on pine (Bt).

R. turionana Hbn. Among pines in early spring.

EUDEMIS Hbn.

E. botrana Schiff. Frenchtown (U S Ag), not rare along the base of the Orange Mts.: larva on thistle, grape, rose and sassafras.

EXARTEMA Clem.

E. zelleriana Fern. Orange Mts., VIII (Wdt).

E. permundana Clem. Orange Mts., VIII, 16 (Kp), Jersey City Hts., VI, 15 (Sb), Newark, light, VII (Wdt), Jamesburg: larva on huckle-, straw- and blackberry, hazel, hickory, &c.

- E. fasciatana* Clem. Sussex Co., IV, 12 (Kp), Orange Mts., VIII (Wdt), Jamesburg, VI, 16 : larva on *Rumex*.
E. inornatana Clem. New Brunswick (Sm), Woodside, VII, 7, Hemlock falls, VIII, 2 (Wdt).
E. exoleta Zell. New Brunswick : larva on gooseberry.

PENTHINA Tr.

- P. nimbatana* Clem. New Brunswick, Newark : the larva on rose.
P. hartmanniana Linn. Newark.
 var. *albeolana* Zell. Orange Mts., VII (Wdt).
P. impudens Wlsm. Clementon, V, 22, Anglesea, V, 16.
P. hebesana Wlk. Orange Mts., VI, Newark, light, Woodside, IX, 19 (Wdt), New Brunswick, VI, IX ; larva on *Stachys palustris*.
P. osmundana Fern. Not common, but no doubt occurs in the State (Dietz).
P. chionosema Zell. New Brunswick.

SERRICORIS Tr.

- S. auricapitana* Wlsm. New York and Pennsylvania.
S. coruscana Clem. Westville, V, 23 (Kp), Newark, Jamesburg, VI, 10.
S. constellatana Zell. South Orange, VI, 5 (Sb), Riverton, V, 30, Jamesburg, VI, 10 ; in meadows, VI and VII (Dietz).
S. instrutana Clem. Anglesea, V, 28.
S. campestrana Zell. Hammonton, VI (Sm), Newark (Sb), Newark, VI, 10 (Wdt).
S. fuscoalbana Zell. Riverton, V, 30.
S. bipartitana Clem. Near New York (Bt), Woodside, VI, 3 (Wdt).

PHÆCASIOPHORA Grt.

- P. confixana* Wlk. New York and Pennsylvania.

PÆDISCA Tr.

- P. 5-maculatana* Rob. Anglesea, VI, 20.
P. robinsoniana Grt. Anglesea, VIII, 10 (Lt, Sm), Jamesburg, VII, 4.
P. argentialbana Wlsm. Fairmount Park, Philadelphia (Lt).
P. basipunctana Wlsm. Orange Mts. V (Wdt), Jamesburg, VI, 10.
P. cataclystiana Wlk. Elizabeth, VII, 20 (Kp), Forest Hill, VIII (Wdt), Anglesea, IX, 3 (Lt), VI, 20, VII, 9 (Sm).
P. giganteana Riley. "New Jersey," Coll. Hulst.
P. fulminana Wlsm. Anglesea.
P. abbreviatana Wlsm. Hemlock falls, VII, 23 (Wdt).
P. constrictana Zell. Anglesea, VII, 9.
P. abruptana Zell. Anglesea, VIII, 10 (Lt).

- P. strenuana* Wlk. Hemlock falls, V, 15 (Sb), Woodside, VIII, 6 (Wdt)
New Brunswick, Anglesea, V, 30, VI, 20, VIII, 21.
- P. scudderiana* Clem. Orange Mts., Boonton, VIII (Wdt), Newark, Anglesea, VI, 20, VII, 9-30: the larva makes a stem gall on golden rod.
- P. otiosana* Clem. Anglesea, VIII, 23 (Kp), VI, 20, VII, 9, IX, 3 (Sm).
- P. similana* Hbn. Anglesea, VI, 20, VII, 9 (Sm), Woodside, VIII, 22 (Wdt), Passaic Co., IV, 14 (Kp).
- P. dorsisignatana* Clem. Newark, IX, Woodside, IX, 19 (Wdt), New Brunswick, Bayside, Anglesea, IX, 4-27: the larva lives in roots of golden rod.

SEMASIA Steph.

- S. formosana* Clem. Hemlock falls, V, 30, Orange Mts., V, VI (Wdt), Newark, VI, 8, Jersey City Hts., V, 21 (Sb), Lahaway, V, 20.
- S. ferruginana* Fern. Clementon, V, 10 (Kp), Orange Mts., V, VI (Wdt), Newark (Sb).
- S. striatana* Clem. Newark at light, VIII (Wdt), Orangs Mts., V, 28 (Kp)
- S. signatana* Clem. Ranges from Maine to Virginia.
- S. argutana* Clem. Massachusetts to Texas.
- S. imbridana* Fern. Anglesea, IX, 4.

PROTEOPTERYX Wlsm.

- P. spoliata* Clem. Jersey City Hts., IV, 7 (Sb), Woodside, IV, 18, Hemlock falls, IV, 17 (Wdt), Anglesea, V, 30, Newark, New Brunswick, IV, common.

STEGANOPTYCHA Steph.

- S. fasciolana* Clem. New York and Pennsylvania.

TMETOCERA Led.

- T. ocellana* Schiff. Vineland (U S Ag), Anglesea, New Brunswick, and throughout the State: the larva sometimes injurious on apple and other fruit trees.

RHOPOBOTA Led.

- R. vacciniana* Pack. Throughout South Jersey on cranberry bogs. The larva is the "vine worm," or "black head," which is always injurious and often ruinous: there are two broods, and the winter is passed in the egg stage. Re-flowing is the best method for this species. Arsenites are useful if applied early. Holding water late answers on a shallow bog.



Fig. 233.—*Rhopobota vacciniana*: enlarged.

PHOXOPTERIS Tr.

- P. nubeculana* Clem. Orange Mts., VI (Wdt), Lahaway V, 20, Anglesea, V, 28, Jamesburg, VI, 16, 20: the larva on apple.
- P. semiovana* Zell. Orange Mts., VIII (Wdt).
- P. spireæfoliana* Clem. Larva common on *Spiræa opulifolia* (Bt).
- P. burgessiana* Zell. Newark, VI (Wdt), South River, V, 26, Clementon, VI, 22.

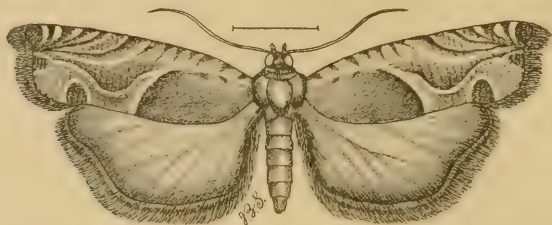


Fig. 234.—Strawberry leaf-roller, *Phoxopteris complana*: enlarged.

- P. comptana* Froel. Common, V and VII, throughout South Jersey. The larva is the strawberry leaf roller and is seasonably and locally destructive: it attacks also blackberry and raspberry but does no harm on them. Arsenate of lead should be very thoroughly applied about May 15 to catch the very young larvæ, and a second spraying a week later will be useful.
- P. platanana* Clem. New Brunswick, V, Jamesburg, VI, 10: larva on sycamore.
- P. cornifolia* Riley. New Brunswick, rare.
- P. goodelliana* Fern. Very common: g. d. over Atlantic slope, early spring (Dietz).

GRAPHOLITHA Tr.

- G. caryana* Fitch. Ocean County, not common; the larva feeds on hulls of hickory and walnuts.
- G. interstictana* Clem. Newark, VI (Wdt), Anglesea (Lt), New Brunswick, Jamesburg, VI, 10, and g. d. throughout the State.
- G. tristrigana* Clem. Anglesea, VI, 20.

ECTYDOLOPHA Zell.

- E. insitici* Zell. Elizabeth (Kp), Newark, VI, 11 (Wdt).

CARPOCAPSA Tr.

- C. pomonella* Linn. The codling moth: common everywhere, its larva seriously injurious to apples: the well known apple-worm. Spray with the arsenites after the fruit is fully set, while it is yet upright and while the lobes of the calyx cup are yet open.



Fig. 235.—Elm twigs bored by the larva of wood Leopard moth, and broken.

MELLISOPUS Riley.

M. latiferreana Wlsm. Newark, VIII, at light, not common, but g. d. (Dietz).

DICHRORAMPHA Gn.

D. simulana Clem. New York, Pennsylvania and probably New Jersey.

Family COSSIDÆ.

These are usually large moths, somewhat resembling the Sphinges in outline but with much smaller head, weak, short palpi and an obsolete tongue. The antennæ are also short and weak in proportion to the size of the insects, though in the male they may be pectinated for at least part of the distance. The legs are comparatively short and weak and, while the insects seem robust enough, they yet give an idea of helplessness and weakness, which is borne out by the feeble flight of the gravid female. In venation they are primitive.

The larvæ are borers, living in the heartwood and they sometimes do considerable injury.

COSSUS Fabr.

C. reticulatus Lint. Taken rarely by the Newark collectors.

C. centerensis Lint. Rare near New York (Bt). The larva lives in the trunks of poplar and almost certainly occurs in northern New Jersey.

C. macmurtrei Guer. This is in the same case as the preceding. The larva bores in oak.

PRIONOXYSTUS Grt.

P. robiniaë Peck. The most common of the species of this family and generally distributed throughout the State. Mr. Davis finds it on Staten Island in June and July; Caldwell (Cr), Newark and Jersey City, VII, 13 in cop (Sb), Camden, VI, 6 (Kp), Ocean County in July. The larva bores in the trunks of locust, willow, poplar, chestnut and oak; but in my experience prefers the latter. It is common near Philadelphia, and in Ocean County a large proportion of the trees are attacked, becoming "doated" and useless except for firewood.

P. querciperda Fitch. Taken rarely by the Newark collectors; VI, 13 (Sb). The larva is said to attack oak and chestnut.

ZEUZERA Latr.

Z. pyrina Fabr. = *æsculi* L. An introduced species which has spread from Jersey City for some distance northward along the Hudson and westward to Elizabeth, causing serious local damage to shade and orchard trees. It is strictly confined to the cities and their immediate vicinity where the

sparrows dominate and exclude the native birds. All sorts of trees are attacked. The insect has also spread to Staten and Long Island, and in June and July is attracted in large numbers to the electric lights. Radical measures are out of question. Palliative measures are, during the dates of flight provide electric lamps in parks and shaded streets with pans below with enough oil to kill the insects that are attracted and fall into them.

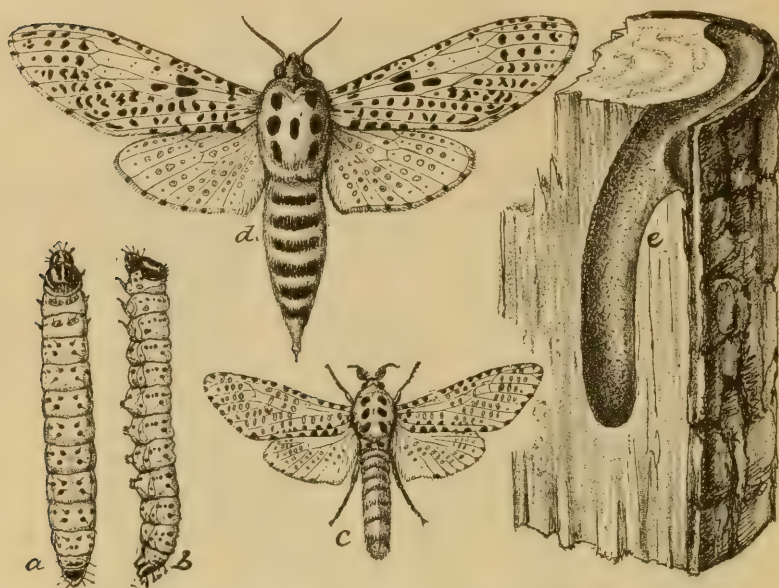


Fig. 236.—The wood leopard moth, *Zeuzera pyrina*: a, b, larva from above and side; c, male; d, female moth; e, gallery made by the larva.

Series MICROPTERIGIDES.

In this series we have a remnant of ancient conditions, the two pairs of wings being held together by a "jugum" or fold at the base of the fore-wings, as occurs in the order *Trichoptera*, from which the *Lepidoptera* are derived. The two pairs of wings are similar in size and venation, and are fastened to a loose-jointed body, to which are attached a minute head and a long cylindrical abdomen.

The *Hepialidæ* are large or very large, known as "ghost moths" from their peculiar hovering silent flight. The *Micropterygidæ* are small or very small and also very rare, no specimen having been taken in New Jersey by any collector, though I have no doubt that two or more actually occur with us.

Family HEPIALIDÆ.**HEPIALUS** Fabr.

- H. auratus* Grt. Very rare near Newark and New York. Nothing is known of its early stages.
- H. argenteomaculatus* Harr. Caldwell (Cr), Fort Lee in early June (Bt), Newark, VI, 7 (Sb). The larva feeds in the roots of alder and, according to Mr. Beutenmuller, requires three years to attain its full growth.
-

Family MICROPTERYGIDÆ.**MICROPTERYX** Hbn.

- M. auricyanea* Wlsm. Occurs at Washington, D. C., and will almost certainly be found in N. J.
- M. pomivorella* Pack. Massachusetts specimens are in the U S N M, and as the larva feeds on leaves of apple, it is probably to be found in the northern part of our own State.



Fig. 239.—A plate of bees, etc. *a*, *Melissodes bimaculata*; *b*, *Andrena vicina*; *c*, *Cerioxys 8-dentata*; *d*, *Halictus ligatus*; *e*, *Synhalomna atriventris*; *f*, *Osmia rustica*; *g*, *Andrena erigenia*; *h*, *Melissodes nigripes*; *i*, *Megachila mendica*; *k*, *Xenoglossa prunina*; *l*, *Tachytes mandibularis*; *m*, *Megachila latimanus*:
more than twice natural size

ORDER HYMENOPTERA.

In this order the adults have four wings with comparatively few veins and cells, never netted, the secondaries usually smaller than the primaries, the two pairs hooked together in flight, naked, not clothed with scales and usually transparent. The mouth parts are mandibulate, the tongue often developed into a long lapping organ, the ovipositor developed into a sting, an augur, a saw or a drill, according to the habits of the insect. Metamorphosis complete.

This order contains the bees, wasps, ants, sawflies, ichneumon flies and the like; a mixture of injurious and beneficial species, with the latter decidedly in the majority. Our collections in this order are only fair and have been chiefly made in South Jersey where Mr. William Fox, of the Academy of Natural Sciences, Philadelphia, has collected rather thoroughly. A number of other Philadelphia collectors have made frequent trips into New Jersey so that we have a fair knowledge of the fauna south of Camden County. Mr. William T. Davis has collected many species on Staten Island, Mr. M. S. Crane has taken a number at Caldwell, and I have picked up a few almost everywhere, and this gives us our knowledge of what occurs in the eastern, central and northern part of the State.

The list as it stands, aside from the economic notes, definitions and comments, is the work of Mr. William H. Ashmead, Assistant Curator of Insects in the United States National Museum. All the divisions are in accord with his own classification and the numbering of the families and sub-families accords with that of the complete arrangement. It will indicate by the breaks the number of those not represented in the State.

In this list all the records and all notes not otherwise credited are my own. No attempt has been made to define some of the families because based upon characters recognizable only by the specialist.

Sub-order I HETEROPHAGA.

Super-family I APOIDEA.

This contains all the bees, social and solitary, and the insects are usually more or less hairy, the hair plumose, feathered, twisted or branched, sometimes dense, sometimes very sparse, sometimes evenly distributed, sometimes massed at one point. The tongue may be long or short, and may be either straight or folded when at rest. The hind legs are often modified in the females and workers to serve for carrying pollen, and sometimes the under side of the breast or of the abdomen serves the same purpose.



Fig. 237.—Hind legs of bees, showing the pollen baskets and combs.

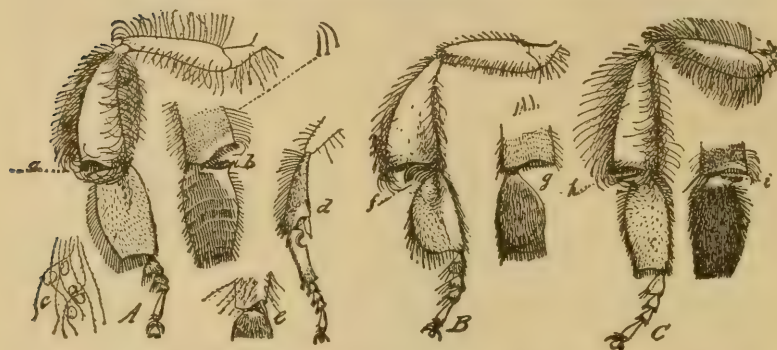


Fig. 238.—Legs of bees, showing pollen gathering structures. A, the honey bee; B, *Melipona*; C, bumble bee.

The larvæ are apparently legless grubs that live upon pollen or honey or a mixture of the two; sometimes fed as needed as in the hive bee, or more usually stored in a cell in quantity sufficient to bring the larva to maturity.

The bees on the whole are decidedly useful, serving as pollenizers to our fruits and flowers, some of the latter being completely dependent upon insect aid for their continued existence.

Social bees are those in which workers are developed; solitary are those in which only males and females exist.

Family I APIDÆ.

APIS Linn.

A. mellifica Linn. The "honey bee": common everywhere in New Jersey throughout the season and domesticated.

Family II BOMBIDÆ.

The "Bumble bees." These are social and make their nests in cavities in the ground, the female wintering and producing workers only in the early summer. These bees have very long tongues and red clover is almost exclusively fertilized by them. They are highly beneficial.

BOMBUS Latr.

- B. americanorum* Fabr. Jamesburg, VIII, 1, Staten Island (Ds), Burlington Co., Lahaway (Sm).
B. affinis Cress. Greenwood Lake (Cr), Westville (Fox).
B. bimaculatus Cress. Philadelphia, VII, 23 (Fox).
B. borealis Kirby. New Jersey (Ash).
B. consimilis Cress. New Brunswick IV, 20, Jamesburg, V, Newark, V, 30 (Sm), Caldwell (Cr), Camden Co., V, 18 (Jn).
B. fervidus Fabr. Jamesburg, Burlington Co., Anglesea, V-VIII (Sm), Gloucester Co., VIII, 24 (Fox), Staten Island (Ds).
B. pennsylvanicus De G. Caldwell (Cr), Westville (Fox).



Fig. 240.—Types of compound hairs found in bees.

- B. ridingsii* Cress. Jamesburg, VIII, 10, Lahaway, VII (Sm), Westville, Gloucester Co., IV, 27, Camden Co., VIII, 3, Philadelphia, VII, 23 (Fox).
- B. separatus* Cress. Caldwell (Cr), Westville (Fox), Staten Island (Ds).
- B. ternarius* Say. Staten Island, VIII (Ds).
- B. terricola* Kirby. No actual records.
- B. vagans* Smith. Jamesburg, Burlington Co., Ocean Co., VII and VIII (Sm), Caldwell (Cr).
- B. virginicus* Oliv. Burlington Co., Jamesburg, Lahaway, May and June (Sm), Caldwell (Cr), South Jersey (Fox), Staten Island, (Ds).

Family IV PSITHYRIDÆ.

These resemble bumble bees, but are really parasitic in that they develop as unbidden guests in the nests of the Bombi. The females have no pollen baskets; the males are not easily distinguished from bumble bees.

PSITHYRUS Lepel. = APATHUS Newn.

- P. ashtoni* Cress. Caldwell, (Cr).
- P. citrinus* Smith. Not actually recorded.
- P. laboriosus* Fabr. Caldwell (Cr).
- P. variabilis* Cress. Maine to Tennessee (Ash)

Family V ANTHOPHORIDÆ.

Long tongued, hairy, solitary bees resembling honey bees in general appearance, but often much stouter with longer, thin vestiture.

ANTHOPHORA Latr.

- A. abrupta* Say. Caldwell (Cr).
- A. bomboides* Kirby. Pennsylvania (Ash).
- A. floridana* Smith. New Jersey, probably (Ash).

XENOGLLOSSA Smith..

- X. pruinosa* Say. Newark, Middlesex, Monmouth Co, VII and VIII (Sm), Riverton, VII, 31, Clementon, VII, 26 (Jn): visits flowers of cucurbits (Ckl), and is the most effective agent in pollenizing them. It often spends the night in the closed flowers.



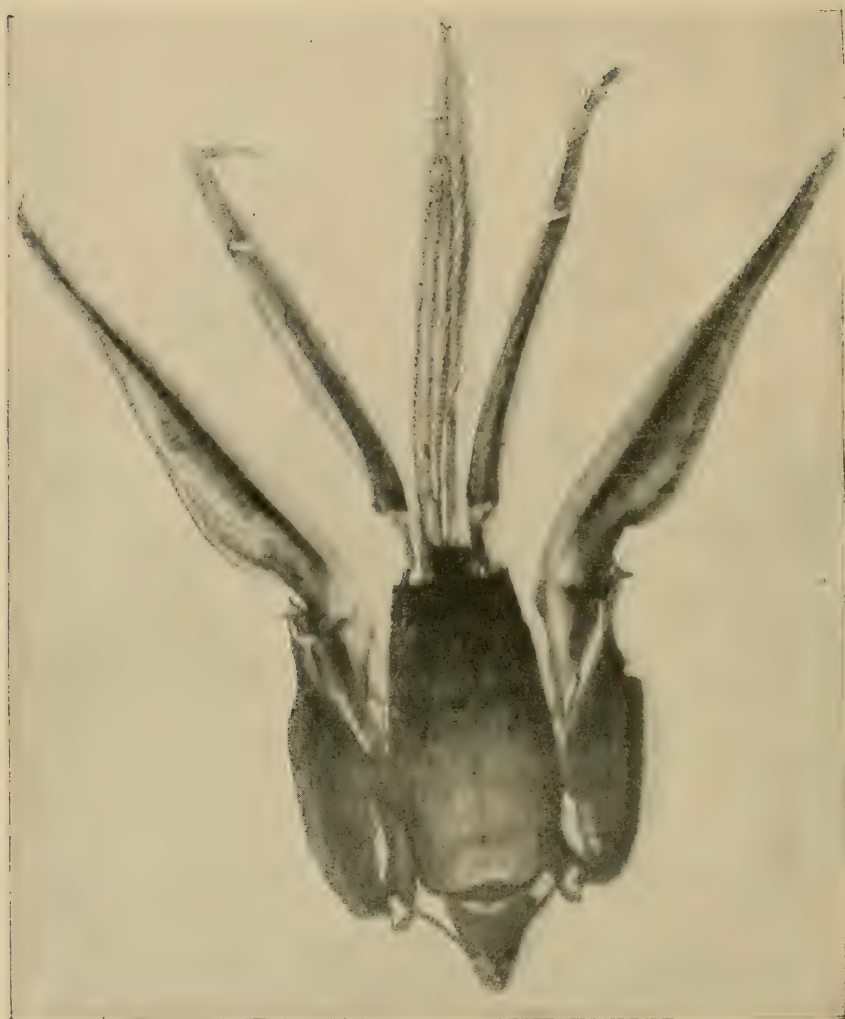


Fig. 241.—Tongue of a bumble bee.

EMPHOR Patton.

- E. bombiformis* Cress. Gloucester Co., VIII, 16 (Fox). Visits flowers of *Ipomea* (Ckl).

SYNHALONIA Patton.

- S. atriventris* Smith. Philadelphia, VIII, 29 (Fox), New Brunswick, Jamesburg, V, 7 (Sm).

MELISSODES Latr.

- M. aurigena* Cress. = variety of *agilis* Cr. (Ckl). Should occur in New Jersey.
M. bimaculata St. Farg. Jamesburg, New Brunswick, VII, 20 (Sm), Staten Island (Ds), Westville (Crn).
M. communis Cress. Rare (Ash).
M. compta Cress. Philadelphia, VII, 23 (Fox), Westville (Crn.)
M. dentiventris Smith. Gloucester Co., VIII, 10 (Fox).
M. desponsa Smith. Philadelphia, VIII, 29 (Fox), "New Jersey" (Cress Coll).
M. nigripes Sm. Jamesburg, V, 4, VI, 1, Lahaway, VI, 1 (Sm), Westville, Riverton (Jn).
M. obliqua Say. Camden Co. (Fox).
M. olivacea Cress. Camden Co. (Fox).
M. pennsylvanica St. Farg. New Jersey (Bt).
M. perplexa Cress. Newark (Sm), Philadelphia, IX, 4 (Fox).
M. rustica Say. Westville (Crn), Newark (Sm).
M. fimbriata Cress. Cape May, VI, 14 (Fox).
M. atripes Cress. Camden Co. (Fox).
M. caliginosa Cress. Gloucester Co., IX, 5 (Fox).
M. atrifrons Sm. Camden Co. (Fox).
M. menucha Cress. Camden Co. (Fox).

ENTECHNIA Patton.

- E. taurea* Say. Ft. Lee, rare (Bt), Camden Co., VI, 3 (Fox).

Family VI NOMADIDÆ.

Resemble wasps in appearance, and are parasitic in the nests of other bees.

PYRRHOMELECTA Ashm.

- P. fumipennis* Say. Philadelphia, IX, 5 (Fox).

EPEOLUS Latr.

- E. concavus* Cress. Newark, Ocean Co. (Sm), Gloucester Co., VII, 15 (Fox).
E. donatus Smith. Westville (Crn, Fox).
E. fumipennis Say. Gloucester Co., VII, 15, Westville (Fox). Mr. Cockerell says this is really Mexican and our species is *bifasciatus* Cress.
E. lunatus Say. Westville (Crn), Merchantville, VIII, 19 (Jn), South Jersey (Fox).
E. mercatus Fabr. Philadelphia, IX, 5 (Fox).
E. pusillus Cress. Westville, rare (Fox).
E. remigatus Fabr. Westville (Crn).

NOMADA Fabr.

- N. affabilis* Cress. Camden Co., V, 12 (Fox).
N. articulata Smith. Camden Co., V, 18 (Fox), Staten Island (Ds).
N. bisignata Say. Caldwell (Cr).
N. electa Cress. Should occur in New Jersey.
N. festiva Cress. Described from New Jersey: Jamesburg (Sm).
N. imbricata Smith. Should occur in New Jersey.
N. incerta Cress. Westville, IV, 19 (Jn), New Jersey (Crn).
N. lepida Cress. Camden Co., IV, 20 (Fox).
N. luteola St. Farg. Jamesburg, IV, 18 (Sm), Philadelphia, V, 12 (Fox), New Jersey (Crn).
N. modesta Cress. Gloucester Co., VIII, 16, Sea Isle City, VII, 22 (Jn), Westville (Fox),
N. placida Cress. Should occur in New Jersey.
N. pygmæa Cress. Camden Co., IV, 20 (Fox).
N. torrida Smith = *rubicunda* Oliv. (Ckll). Should occur in New Jersey.
N. vineta Say. "New Jersey" (Cress Coll).

Family VII CERATINIDÆ.

Little, naked, blue green species, make cells in the pith of briars, &c, storing with thick honey.

CERATINA Latr.

- C. dupla* Say. Everywhere, April and May (Ash).

Family VIII XYLOCOPIDÆ.**XYLOCOPA Latr.**

- X. virginica* Dru. The large carpenter bee: common all over the State in May and June. Makes holes half an inch in diameter in boards or beams about porches, sheds, &c.
-

Family IX MEGACHILIDÆ.**Sub-family I OSMIINÆ.**

Large-headed, chunky bees, usually blue or green in color.

TRYPETES Schenck.

- T. carinatum* Cress. Camden Co., VII, 12 (Fox), "New Jersey" (Cress Coll).
T. variolosum Cress. Should occur in New Jersey.

ALCIDAMEA Cress.

- A. producta* Cress. Lahaway, VI (Sm), Westville (Fox), Caldwell (Cr).

CERATOSMIA Thomson.

- C. lignaria* Say. Caldwell (Cr), "New Jersey" (Cress Coll).

OSMIA Panz.

- O. atriventris* Cress. Flatbush, N. Y., VI, 9 (Zabriskie), Philadelphia, V, 12 (Fox), "New Jersey" (Cress Coll).
O. cognata Cress. = a var. of *canadensis* Cress. (Ckll); should be found in New Jersey.
O. faceta Cress. New Jersey, probably.
O. frigida Smith. New Jersey, probably.
O. latitarsis Cress. = female of *bucephala* Cress. (Ckll); should occur in New Jersey.
O. purpurea Cress. Should occur in New Jersey.
O. simillima Smith. Monmouth Co., V, 28 (Fox), Caldwell (Cr).
O. chalybea Smith. New Brunswick, IV, V (Sm).

NOTHOSMIA Ashm.

- N. albiventris* Cress. Caldwell (Cr), "New Jersey" (Crn).
N. rustica Cress. Camden Co. (Fox), Nyack, N. Y. (Zabriskie).
N. vicina Cress. Philadelphia, V, 28 (Fox).
N. distincta Cress. Philadelphia, V, 12, Camden Co. (Fox).

Sub-family II MEGACHILINÆ.

Leaf-cutter bees that make their nests in burrows, forming cells of semi-circular pieces of leaves.

MEGACHILE Latr.

- M. addenda* Cress. "New Jersey" (Cress Coll).
M. brevis Say. Camden and Gloucester Counties, VII, VIII (Fox), Staten Island (Ds), Caldwell (Cr), Ocean Co. (Sm).
M. exilis Cress. "New Jersey" (Cress Coll).
M. frigida Smith. Camden Co., VII, 5, Gloucester, VIII, 10, 30 (Fox), Westville (Crn), Mr. Cockerell says this is a synonym of *vidua* Sm.
M. generosa Cress. Philadelphia, VII, 25 (Fox).
M. latimanus Say. Ocean Co., May (Sm), Gloucester Co., VIII, 10 (Fox), Staten Island (Ds), Caldwell (Cr), Westville (Crn).
M. melanophæa Smith. Westville (Crn).
M. mendica Cress. Lahaway, VII, Anglesea, IX, 1, Camden Co., VIII, 15 (Fox), Caldwell (Cr), Westville (Crn).
M. montivaga Cress. Should occur in New Jersey.
M. morio Smith. Should occur in New Jersey.
M. mucida Cress. New Brunswick (Sm).
M. optiva Cress. Gloucester Co., VIII, 10 (Fox).
M. perbrevis Cress. Philadelphia, IX, 5 (Fox), "New Jersey" (Cress Coll).
M. petularis Cress. Philadelphia, VII, 25 (Fox).
M. pruina Smith. "New Jersey" (Ashm).
M. pugnata Say. Camden Co., IX, 7 (Fox), New Jersey (Cress Coll).
M. sayi Cress. = *inimica* = *pugnata*, according to Robertson (Ckl).
M. studiosa Cress. "New Jersey."
M. femorata Sm. "New Jersey" (Bt).
M. gemula Cress. Philadelphia, VII, 10 (Fox).

Sub-family III ANTHIDIINÆ.

ANTHIDIUM Fabr.

- A. notatum* Latr. New Jersey (Cress Coll).

Family X STELIDIDÆ.

Sub-family I STELIDINÆ.

PROTOSTELIS Friese.

- P. lateralis* Cress Camden Co., V, 18 (Fox).

MELANOSTELIS Ashm.

M. nitida Cress. New York, and probably in New Jersey.

M. foxi Ashm. Camden Co., VII, 12 (Fox).

Sub-family II CÆLIOXINÆ.

The species are parasitic in the cells of *Megachile*.

CÆLIOXYS Latr.

C. alternata Say. Should occur in New Jersey.

C. dubitata Smith. Gloucester Co., IX, 21 (= *rufilarsis* Sm).

C. lateralis Cress. Pennsylvania (Ckll).

C. lucrosa Cress. Nyack, N. Y. (Zabriskie).

C. modesta Smith. Philadelphia, VIII, 17 (Fox).

C. moesta Cress. Philadelphia, VIII, 17 (Fox).

C. 8-dentata Say. Newark, Ocean Co., New Brunswick, VII, 16 (Sm),
Caldwell (Cr), Camden Co., VII, 12 (Fox).

C. rufitarsis Smith. Philadelphia, VII, 22 (Fox).

C. sodalis Cress. Nyack, N. Y. (Zabriskie).

C. sayi Robt. "New Jersey" (Ash).

Family XI PANURGIDÆ.**MACROPIS** Panzer.

M. ciliata Patton. New York, Flatbush, IV, 19 (Zabriskie).

M. patellata Patton. Camden Co., VI, 28, VII, 5, VIII, 12 (Fox).

COCKERELLIA Ashm.

C. octomaculata Say. Westville (Crn), Camden Co. (Fox).

PANURGUS Panzer.

P. andrenoides Smith. New York (Ash).

PANURGINUS Nylander.

P. tricolor Ckll. Gloucester Co., VIII, 16 (Fox).

P. pauper Cress. Should occur in New Jersey.

CALLIOPSIS Smith.

C. andreniformis Smith. New York, Virginia, Canada (Ash).

Family XII ANDRENIDÆ.

These are short-tongued bees, many of them digging or mining under the surface, making burrows of considerable extent. All of them are solitary.

Sub-family I ANDRENINÆ.

Contains species of moderate or rather large size.

MELITTA Kirby = CILISSA Leach.

M. americana Smith. Should occur in New Jersey.

ANDRENA Fabr.

- A. bicolor* Fabr. Newark, Burlington Co., V, Lahaway, VI (Sm).
- A. erythronii* Robt. Should occur in New Jersey.
- A. erigeniæ* Robt. Newark, Jamesburg, Burlington, and Atlantic Co., May.
- A. americana* D. T. = *fimbriata* Smith. Staten Island, VIII, IX (Ds).
- A. flavoclypeata* Sm. Newark, May, very common.
- A. fragilis* Smith. Should occur in New Jersey.
- A. hilaris* Smith. "New Jersey" (Ashm).
- A. integra* Smith. Should occur in New Jersey.
- A. nuda* Robt. Newark, Jamesburg, Lahaway, VI, 7 (Sm).
- A. perplexa* Smith. Should occur in New Jersey.
- A. placida* Smith, "New Jersey" (Ashm).
- A. pruni* Robt. Burlington Co., V (Sm).
- A. simplex* Smith. Sure to occur in New Jersey.
- A. valida* Say. "New Jersey."
- A. nubecula* Sm. "New Jersey" (Ashm).
- A. claytoniæ* Robt. "New Jersey" (Sm).
- A. salicis* Robt. "New Jersey" (Sm).
- A. vicina* Sm. Newark, Jamesburg, Lahaway, Burlington Co., May.
- A. zabriskei* Ashm. Staten Island, IV (Ds).
- A. erythrogaster* Ashm. Camden Co. (Fox).
- A. ovalis* Ashm. "New Jersey" (Ashm).
- A. tuberculata* Ashm. "New Jersey" (Ashm).

Sub-family II HALICTINÆ.

Moderate sized, small or very small bees, sometimes metallic blue or green in color, mining in sandy spots or in vertical banks, sometimes in large colonies.

AUGOCHLORA Smith.

- A. aurata* Sm. Camden Co., VIII, 9, Ocean Grove, V (Fox), Staten Island, IV and V (Ds).

- A. fervida* Smith. Should occur in New Jersey.
A. humeralis Patton. Lahaway, common (Sm): has formed a great colony at this point, the soil being honeycombed locally with the burrows.
A. pura Say. Caldwell (Cr).
A. viridula Smith. "New Jersey (Sm).
A. cuprea Smith. Camden Co., VIII, 3 (Fox).
A. sumptuosus Smith. New Jersey (U S N M).
A. similis Robt. New Jersey, probably.

AGAPOSTEMON Smith.

- A. nigricornis* Fabr. = *viridulus* Fabr. (Ckll), Caldwell (Cr).
A. pulchra Smith. "New Jersey," common (Bt), = *radiatus* (Ckll).
A. radiatus Say. Burlington Co., V, Middlesex (Sm), Gloucester, VII, 5 (Fox).
A. splendens Lepel. New Jersey (Ashm).
A. æruginosus Smith. Camden, Gloucester Co., VIII, 16 (Fox).

HALICTUS Latr.

- H. albipennis* Robt. Probably in New Jersey (Ashm).
H. albitarsis Cress. Sure to occur in New Jersey.
H. imitatus Smith. Probably occurs in New Jersey.
H. ligatus Say. Gloucester Co, VIII, 22, Camden Co, VII, 27 (U S N M), Caldwell, common (Cr).
H. pilosus Smith. Camden Co., X, 20 (U S N M).
H. lævissimus Smith. Staten Island, IX (Ds).
H. armaticeps Cress. Staten Island, VIII (Ds).
H. capitosus Smith. Camden (U S N M).
H. confusus Smith. Camden, X, 20 (U S N M).
H. coriaceus Smith. Staten Island, IV (Ds).
H. disparalis Cress. Probably in New Jersey (Ashm).
H. fasciatus Nyl. Riverton, X, 13 (Jn), South Jersey (Fox), Philadelphia, VII, 23 (U S N M), Staten Island (Ds).
H. fuscipennis Smith. Philadelphia, VIII, 29 (Fox), Staten Island, VI (Ds).
H. inconspicuus Smith. Staten Island, VII (Ds).
H. nelumbonis Robt. Camden, VII, 27, IX, 7 (Fox).
H. nymphalis Smith. Camden, X, 20 (Fox).
H. nymphæarum Robt. South Jersey (Fox).
H. ornatipes Cress. "New Jersey."
H. parallelus Say. South Jersey (Fox).
H. pectoralis Smith. Camden, V, 48 (U S N M).
H. palustris Rob. Camden, VII, 27 (U S N M).

- H. similis* Smith. New Jersey, probably.
H. stultus Cress. Canada and Texas (Crn).
H. subquadratus Smith. New Jersey, probably.
H. virginicus Ashm. New Jersey, probably (Ashm).
H. zephyrus Smith. South Jersey (Fox).

Sub-family **III SPHECODINÆ.**

SPHECODES Latr.

- S. arvensis* Patt. Camden Co., V, 18, Gloucester Co., VII, 22 (Fox).
S. dichroa Smith. Camden Co., V, 18 (Fox), Staten Island, VII (Ds), Caldwell (Cr).
S. falcifer Patt. New Jersey (U S N M).
S. confertus Say. Prospertown, VI, 7 (Sm).
S. mandibularis Cress. Camden Co., VI, 15 (Fox).



Family XIII COLLETIDÆ.

Moderate sized hairy bees, burrowing in sandy places very early in spring.

COLLETES Latr.

- C. armata* Patt. New Jersey (Ashm).
C. americana Cress. Camden Co., VII, 3 (Fox).
C. compacta Cress. Philadelphia, IV, 20 (Fox), Lahaway, III, IV, V (Sm).
C. inæqualis Say. Camden Co. (Fox), Atco (Fox).
C. propinqua Cress. Philadelphia, IV, 20 (Fox).
C. valida Cress. Camden Co., V, 18 (Fox), Staten Island, IV (Ds).



Family XIV PROSOPIDÆ.

PROSOPIS Fabr.

- P. affinis* Smith. Caldwell (Cr).
P. antennata Cress. Recorded from New Jersey only.
P. confluens Ckll. Camden Co. (Ckll).
P. modestus Say. Camden Co., VI, 18 (Fox).
P. pygmæa Ckll. Camden Co. (Fox).

- P. sparsa* Cress. New Jersey, probably.
P. verticalis Cress. Probably in New Jersey.
P. ziziae Robt. Ocean Grove (Ckll).
-

Super family II SPHEGOIDEA.

These are the fossorial or digging wasps, and are always solitary. They provision their nests with other insects or may be parasitic. As a whole they are decidedly useful.

Family XV OXYBELIDÆ.

OXYBELUS Latr.

- O. mucronatus* Pack. Caldwell (Cr).
O. quadri-notatus Say. Jamesburg (Sm), "New Jersey" (Cress Coll), Camden, Gloucester Co., VIII, 24 (Fox).
O. subulatus Robt. Gloucester Co., VII, 5 and Camden Co. VI, 26, VII, 12 (Fox), Ocean Co. (Sm).
O. cornutus Robt. Gloucester and Camden Cos., VII, 28, VIII, 5 (Fox).
O. packardii Robt. Camden Co., VII, 12 (Fox).
O. lætus Say. Camden Co., VII, 12, VIII, 9 (Fox).

NOTOGLOSSA Dahlbom.

- N. emarginatus* Say. Ft. Lee (Bt), South Jersey, VI, 2, Camden Co., VI, 28, VII, 12, 22 (Fox).
-

Family XVI CRABRONIDÆ

Rather small diggers, with an unusually large, quadrate head. They are not uniform in habit, and many of them live in pithy stems or burrow in dead wood or make use of an old cavity. They store their cells with flies chiefly, but sometimes with plant-lice or even spiders.

Sub-family I ANACRABRONINÆ.

ANACRABRO Pack.

- A. ocellatus* Pack. Westville (Cr), Staten Island, VI, 2 (Ds), Camden Co., VIII, 10 (Fox).

Sub-family II LINDENIINÆ.

LINDENIUS Lepel.

L. errans Fox. Gloucester Co., VIII, 16 (Fox).

Sub-family III CRABRONINÆ.

Tribe I Crabronini.

SOLENIUS Lepel.

C. interruptus St. Farg. Lahaway, VI, 1 (Sm), Staten Island, VII (Ds), Camden Co., VII, 5 (Fox), "New Jersey" (Cress Coll).

C. producticollis Pack. "New Jersey," VII, 31, Philadelphia, VII, 9 (Fox), "New Jersey" (Pack).

ECTEMNIUS Dahlbom.

E. montanus Cress. Philadelphia, VIII, 16 (Fox), Long Island (Ashm).

E. pauper Pack. Should occur in New Jersey.

E. brunneipes Pack. Should occur in New Jersey.

E. corrugatus Pack. Camden Co., VIII, 30 (Fox).

CRABRO Fabr.

C. maculatus Fabr. New Jersey (Bt), Staten Island, VII (Ds): = *singularis* Pack. = *quadrangularis* Pack. = *frigida* Smith (syn. after Ashm).

C. trapezoideus Pack. Westville (Cr), Camden Co., VII, 5 (Fox).

HYPOCRABRO Ashm.

H. decemmaculatus Say. Camden Co., VII, 27 (Fox).

H. packardii Cress. New Jersey, probably.

PSEUDOCRABRO Ashm.

P. chrysarginus Lepel. = *villosifrons* Pack., female (Ashm). Camden Co., VII, 12, 27, Philadelphia, VII, 17 (Fox).

XESTOCRABRO Ashm.

X. paucimaculatus Say. Camden Co., VII, 19, Gloucester Co., VII, 27, VIII, 16 (Fox).

X. sexmaculatus Say. Caldwell (Cr), hatched from hickory and dogwood, Staten Island (Ds), Camden Co., VII, 27, Gloucester Co., VIII, 16 (Fox).

X. trifasciatus Say. Staten Island, VIII (Ds), Camden Co., VII, 12, 27, VIII, 10 (Fox).

XYLOCRABRO Ashm.

- X. stirpicola Pack. Camden Co., VII, 19, Gloucester Co., VIII, 16 (Fox),
"New Jersey" (Pack).

CLYTOCHRYsus Morawitz.

- C. nigrifrons Cress. New Brunswick, Lahaway, VI, 24 (Sm).
C. obscurus Smith. Gloucester Co., VII, 15, VIII, 16, Camden Co., VII, 19,
27 (Fox), "New Jersey" (Crn).
C. septemtrionalis Pack. Camden Co., VII, 27 (Fox).

PROTOTHYREOPUS Ashm.

- P. bigeminus Patt. Lahaway (Sm), Camden, VIII, 12, Philadelphia, VII,
10 (Fox).

Tribe II Thyreopini.

SYNOTHYREOPUS Ashm.

- S. advenus Smith. New Jersey, probably.
S. tumidus Pack. Westville (Crn), Philadelphia, VII, 20, IX, 5 (Fox).
S. vernalis Fox. Clementon, V, 22 (Viereck).

PARANOTHYREUS Kohl.

- P. cingulatus Pack. Camden Co., VIII, 31, IX, 29 (Fox).

THYREOPUS St. Farg.

- T. argus Pack. Camden Co., VI, 28, VIII, 9, 24 (Fox), Long Island (Ashm).
T. cribrellifer Pack. Long Island (Ashm).
T. provancheri Fox. Should occur in New Jersey.

BLEPHARIPUS Lepel.

- B. ater Cress. New Jersey, probably.
B. impressifrons Smith. New Jersey, probably.

CROSSOCERUS Lepel.

- C. sulcus Fox. Long Island (Ashm).
C. minimus Pack. Camden Co., V, 9, 18, VIII, 9 (Fox).
C. scutellatus Say. Camden Co., V, 18 (Fox).

CUPHOPTERUS Morawitz.

- C. nitidiventris Fox. Camden Co., VII, 5 (Fox).
C. maculiclypeus Smith. Clementon, V, 30 (Viereck).

Sub-family IV RHOPALINÆ.

RHOPALUM Kirby.

R. pedicellatum Pack. Gloucester Co., IX, 7, Riverton, V, 30 (Viereck).

R. rufigaster Pack. "New Jersey" (Ashm).

Family XVII PEMPREDONIDÆ.

Usually slender, rather small wasps, shining black in color. They burrow in the pith of dry branches, making very irregular and complicated channels: the cells are stored with plant-lice.

Sub-family I PEMPREDONINÆ.

SPILOMENA Shuck.

S. pusilla Say. New Jersey, probably.

STIGMUS Jur.

S. americanus Pack. Camden Co., VI, 28 (Fox).

S. fraternus Say. New Jersey, probably.

CEMONUS Jur.

C. inornatus Pack. "New Jersey" (Cress Coll), Flatbush, Long Island (Zabriskie).

PEMPREDON Latr.

P. concolor Say. Camden Co., VII, 27 (Fox).

PASSALÆCUS Shuck.

P. annulatus Say. Camden Co., VII, 28, Philadelphia, VII, 14 (Fox).

P. mandibularis Cress. Northern New Jersey (Ashm).

Sub-family II PSENINÆ.

PSEN Latr.

P. cressonii Pack. Camden Co., IX, 7 (Fox).

P. denticulata Pack. Camden Co., IX, 7 (Fox).

P. kohlii Fox. Should occur in New Jersey.

P. leucopus Say. Should occur in New Jersey.

P. mellipes Say. New Jersey, probably.

- P. monticola* Pack. New Jersey, probably.
P. niger Pack. "New Jersey" (U S N M).
P. pauper Pack. Westville (Crn), Camden Co., VIII, 24 (Fox).
P. regularis Fox. Should occur in New Jersey.
-

Family XVIII BEMBECIDÆ.

Handsome yellow-marked wasps of moderate or large size, the abdomen broad at base and not pedicillate. The labium or upper lip is very long, triangular and pointed. The insects burrow in sandy places and feed their larvæ with flies.

BEMBIDULA Burm.

- B. quadrifasciata* Say. Anglesea, IX, 4, Lahaway (Sm), Camden Co., VIII, 9, Gloucester Co., VIII, 4, IX, 7 (Fox).
B. ventralis Say. South Jersey, Atlantic Co., VI, 29, Gloucester Co., VII, 11, 26, VIII, 31 (Fox).

BEMBEX Fabr.

- B. pruinosa* Fox. Should occur in New Jersey.
B. spinolæ Lep. Jamesburg, VII, 10, Anglesea, VII, 11, Ocean Co. (Sm), Sandy Hook (Bt).

MICROBEMBEX Patt.

- M. monodonta* Say. Caldwell (Cr), Lahaway (Sm), Staten Island, V, IX (Ds), Sandy Hook, burrows in white sand (Bt), Camden Co., VI, 28, Atlantic Co., VI, 29 (Fox).

MONEDULA Latr.

- M. carolina* Fabr. Anglesea, IX, 4, Lahaway (Sm), Camden Co., VIII, 3 (Fox).
-

XIX Family LARRIDÆ.

Head broad, closely applied to the thorax, abdomen not pedicillate, oval, the middle tibia with one spur. Makes burrows in sandy places and provisions them with Orthopterous insects, grasshoppers, crickets and the like.

Sub-family I LARRINÆ.

NOTOGONIA Costa.

- N. argentata* Beauv. Westville (Cr), Sandy Hook (Bt), Camden Co., VIII, 24 (Fox).
N. nigripennis Fox. Probably in New Jersey.
N. æqualis Fox. Should occur in New Jersey.

ANCISTROMMA Fox.

- A. distincta* Smith. Westville (Crn), Long Island (Ds), Gloucester Co., VIII, 24, Camden Co., VIII, 24, 31 (Fox).

LARRA Latr.

- L. analis* Fabr. Swedesboro, VII, 15, Camden, Gloucester Co., VIII, 16 (Fox).
L. cressoni Fox. New Jersey, probably.
L. pennsylvanica Beauv. Westville (Crn), Camden and Gloucester Co., VIII, 31, IX, 5 (Fox).
L. americana Cress. Camden and Gloucester Cos., VIII, 16 (Fox).

TACHYTES Panz.

- T. aurulentus* Fabr. Gloucester and Camden Cos., VII, VIII (Fox), Lahaway (Sm).
T. distinctus Smith. New Jersey, probably.
T. harpax Patt. Camden Co. (Fox), Lahaway (Sm).
T. mandibularis Patt. Sandy Hook, VIII, So. Jersey, VI, 2, Ocean Co. (Sm), Westville (Crn), Long Island, VII (Ds), Camden Co., VI, 20, 27 (Fox).
T. calcaratus Fox. Camden Co., Jamesburg, IX, 4, Swedesboro, VII, 5, South Jersey, VI, 2 (Sm).
T. columbæ Fox. New Jersey, probably.
T. crassus Patt. New Jersey, probably.
T. parvus Fox. Camden Co., VIII (Fox).
T. mergus Fox. Camden Co., VII (Fox).
T. pepticus Say. Lakewood (Sm).
T. validus Cress. Long Island to Texas (Ashm).

TACHYSPHEX Kohl.

- T. tarsatus* Say. Gloucester and Camden Cos., VII, VIII (Fox), Clementon, V, 19 (Viereck), Anglesea, VI, 25 (Sm).
T. dubius Fox. Camden Co., VIII, 24 (Fox).
T. punctifrons Fox. Camden Co., IX, 12 (Fox).
T. minimus Fox. Camden Co., VII (Fox).
T. terminata Smith. Anglesea, IX, 4 (Sm).
T. quebecensis Prov. "New Jersey," VIII, 24, 31 (U S N M).

Sub-family II LYRODINÆ.

LYRODA Say.

- L. subita* Say. Westville (Crn), Gloucester and Camden Co., VIII, 24, 31 (Fox).
L. triloba Say. Camden Co. (Fox).

Sub-family III MISCOPHINÆ.

MISCOPHUS Jurine.

M. americanus Fox. Camden Co., VII, 23, VIII, 9, Gloucester Co., VII, 26, VIII, 3 (Fox).

Sub-family IV PISONINÆ.

BOTHYNOSTETHUS Kohl.

B. distinctus Fox. Camden Co., VII, VIII (Fox), Atlantic Co. (Sm).

Family XX PHILANTHIDÆ.

Rather small or medium sized wasps with a broad, thick head, the abdomen constricted at the base but not petiolated, males with brushes of long hair on each side of the clypeus. They burrow in the ground and store their cells with beetles or with species of *Halictus*, a small digger bee.

Sub-family I CERCERINÆ.

EUCERCERIS Cress.

E. laticeps Cress. Gloucester Co., VII, 27, VIII, 23 (Fox).

E. zonatus Say. Probably occurs in New Jersey.

CERCERIS Latr.

C. bicornuta Guer. Anglesea, VIII, 24, IX, 4 (Sm), Camden Co., VII, 22 (Fox).

C. clypeata Dahlb. Anglesea, VII, 22 (Sm), Toms River (Bt), Staten Island (Ds).

C. compacta Cress. Caldwell (Cr), Philadelphia, VII, 23 (Fox).

C. dentifrons Cress. Philadelphia, IX, 5, (Fox).

C. deserta Say. Staten Island, VII (Ds), Ft. Lee (Bt), Philadelphia, IX, 5 (Fox), Caldwell (Cr) : common everywhere in the State.

C. dufourii Guer. Camden Co., VII, 22, Gloucester Co., VII, 5, IX, 7 (Fox).

C. fumipennis Say. Westville (Crn), Lahaway, VII, 17 (Sm), Atlantic Co., VI, 29 (Fox).

C. venator Cress. Westville (Crn). Other specimens in Cresson collection from other parts of New Jersey. Gloucester Co., VII, 5, 22 (Fox).

C. robertsonii Fox. Lahaway, VII, 12 (Sm).

C. n. sp. Fox. Lahaway, VII, 12 (Sm).

Sub-family **II PHILANTHINÆ.****APHILANTHOPS** Patt.

A. frigidus Smith. Camden Co., VII, 12 (Fox).

PSEUDANTHOPHILUS Ashm.

P. ventilabris Cress. South Jersey, VI, 2 (Sm).

ANTHOPHILUS Dahlbom.

A. bilunatus Cress. Lahaway (Sm), Camden Co., VIII, 9, 31, IX, 18 (Fox).

A. dubius Cress. Swedesboro, VII, 15 (Sm).

A. politus Say. Lahaway (Sm), Camden, VII, 27, Atlantic Co., VI, 29, Gloucester Co., VIII, 24, VII, 22 (Fox), Westville (Crn).

A. punctatus Say. Jamesburg, VII, 15, Swedesboro, VII, 15 (Sm), Staten Island, VIII (Ds), Caldwell (Cr), Westville (Crn), New Jersey, VII, 22, Camden Co., VIII, 5 (Fox).

A. solivagus Say. Gloucester Co., VII, 24 (Fox).

A. sanborni Cress. Swedesboro, VII, 15 (Sm), Staten Island, VIII (Ds).

Family XXI TRYPOXYLIDÆ.

Make cells in pithy plants, separating them by mud partitions, or make mud cells against walls, storing them with spiders. The wasps are slender, without yellow bands on the abdomen.

TRYPOXYLON Latr.

T. albopilosum Fox. Jamesburg, Lahaway, VI, 7 (Sm), Staten Island, IX (Ds), Camden Co., Gloucester Co., VI, 28 (Fox).

T. clavatum Say. Middlesex Co., VIII, 21 (Sm), New Jersey, VIII, 3 (Fox).

T. carinatum Say. "New Jersey" (Ashm).

T. frigidum Smith. "New Jersey," VI, 19 (Cress Coll).

T. ornatipes Fox. New Jersey, probably.

T. pennsylvanicum Sauss. Camden Co., VI, 28 (Fox).

T. politum Say. New Brunswick, July (Sm), Staten Island (Ds), Caldwell (Cr), Westville (Crn).

T. rubrocinctum Pack. Gloucester Co., VII, 5, VIII, 16, Westville (Crn), Camden Co. (Fox).

T. tridentatum Pack. Recorded from New Jersey.

T. excavatum Smith. New Brunswick, July (Sm), Staten Island (Ds).

T. bidentatum Fox. New Jersey, probably.

Family XXII MELLINIDÆ.

Abdomen petiolate, smooth and shining: preys upon flies, which some species capture by feigning death.

MELLINUS Fabr.

M. bimaculatus Say. New Jersey, probably.

EUSPONGUS St. Farg.

E. bipunctatus Say. Camden Co., VII, 9, IX, 7 (Fox).

Family XXIII NYSSONIDÆ.

Medium-sized diggers resembling the Eumenidæ among the true wasps: they provision their nests with leaf hoppers, young frog hoppers, and other Hemiptera.

Sub-family I GORYTINÆ.**HOPLISUS** St. Farg.

H. fulvipennis Smith. New Jersey, probably.

H. microcephalus Handl. Camden Co., VI, 28 (Fox).

GORYTES Latr.

G. nebulosus Pack. Lahaway, VII, 1 (Sm), "New Jersey" (Pack).

G. phaleratus Say. Jamesburg, VIII, 4 (Sm), Staten Island, VII (Ds).

G. flavicornis Pack. New York, Pennsylvania (Ashm).

G. simillimus Smith. "New Jersey."

Sub-family II ALYSONINÆ.**ALYSON** Jur.

A. melleus Say. Camden Co., VII, 6, VIII, 10 (Fox).

A. oppositus Say. Westville (Crn), Gloucester and Camden Co., VII, VIII (Fox).

Sub-family III NYSSONINÆ.**NYSSON** Latr.

N. lateralis Pack. Philadelphia, VI, 11 (Fox).

N. plagiatus Cress. Camden Co., VII, 19, 27 (Fox).

N. æqualis Patt. Camden Co., VII, 19, 27 (Fox), Gloucester Co., VII, 26 (Fox).

BRACHYSTEGUS Costa.

B. opulentus Gerts. Camden Co., VI, 28 (Fox).

Sub-family IV ASTATINÆ.**ASTATA** Latr.

A. bicolor Say. Gloucester Co., VIII, 16 (Fox), New Jersey (Cress Coll).

A. unicolor Say. Gloucester Co., VIII, 16 (Fox), Westville (Crn), Jamesburg, VIII, 11 (Sm).

A. pygidialis Fox. Camden Co. (Fox).

A. occidentalis Cress. Philadelphia, VIII, 9 (Fox).

Family XXIV STIZIDÆ.**SPHECIUS** Dahlb.

S. speciosus Dru. Not uncommon throughout New Jersey. Caldwell, common (Cr), New Brunswick, VII, 26, VIII, 26, Dunnfield, VII, 12 (Sm), Staten Island (Ds), Sandy Hook (Bt). This is a very large species that preys upon Cicadas, burying them in burrows made underground.

Family XXV SPHEGIDÆ.

This family is easily recognized by the long slender pedicel or stalk connecting the thorax with the main bulb of the abdomen. From this peculiarity Prof. Comstock calls them thread-waisted wasps. Among these are the common mud-daubers that plaster their clay or earthen cells against out-houses and under porches, sometimes inside of shutters or in similar sheltered places. These mud cells are filled with caterpillars, spiders or young grasshoppers, all of which have been paralyzed by the mother wasp, as food for the grub-like larva. When full-grown this makes a parchment-like cocoon, which turns brown in color and in which the pupa is formed. These wasps are distinctly beneficial, and destroy great numbers of grasshoppers and caterpillars annually as food for their young. Some of the species are true diggers and do not make mud nests, but their feeding habits are similar.

SPHEX Linn.

S. bifoveolatus Taschb. Swedesboro, VII, 15, Ocean Co.. Newark, New Brunswick, VII, 17 (Sm).



Fig. 242.



Fig. 243.

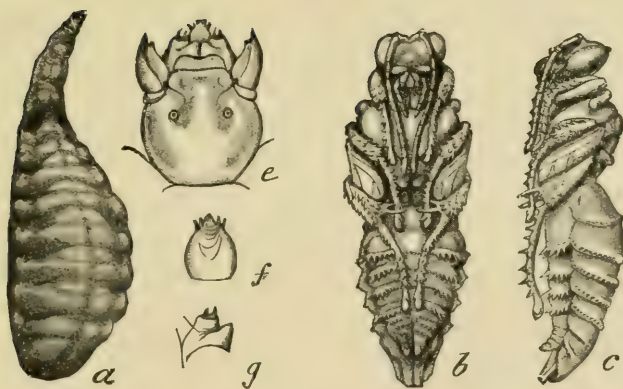


Fig. 244.

Fig. 242.—*Sphecus speciosus* ; carrying off a Cicada to its burrow.

Fig. 243.—Larva of *S. speciosus* feeding on the Cicada buried by its parent.

Fig. 244.—*a*, larva ; *b*, *c*, pupa from below and side of *S. speciosus* : *e*, *f*, *g*, details of larval structure.

S. ichneumonæ Linn. Orange Mts., Swedesboro VII, 15, Anglesea, IX, 6 (Sm), and common everywhere in New Jersey.

S. pennsylvanica Linn. Common everywhere in New Jersey.

S. nearticus Kohl. Camden and Gloucester Cos., VII, 26 (Fox).

S. brunneipes Cress. Gloucester Co., VII, 5 (Fox).



Fig. 245.—*Sphegus ichneumonæ*.

ISODONTIA Patt.

I. philadelphica St. Farg.

Ocean Co. (Sm), Caldwell (Cr), Westville (Crn).

I. tibalis St. Farg. Camden Co., VII, 24 (Fox), New Brunswick, Orange Mts., Swedesboro, VII, 15, Anglesea, IX, 6 (Sm), Caldwell (Cr), Westville (Crn).

I. macrocephalus Fox. Philadelphia (Fox).

CHLORION Latr.

C. cæruleum Dru. Long Island (Ds), New Jersey, common (Bt), Caldwell (Cr).

C. nearcticus Robt. Lahaway, VII, 12, Anglesea, VIII, 21 (Sm).

HARPACTOPUS Smith.

H. abdominalis Cress. Ocean Co. (Sm).

PRIONONYX Dahlb.

P. atrata St. Farg. Camden Co., VII, 12, 19, Gloucester Co., VII, 5 (Fox), Caldwell (Cr).

P. thomæ Fabr. Westville (Crn.)

Sub-family II AMMOPHILINÆ.

AMMOPHILA Kirby.

A. arvensis St. Farg. New Jersey, g. d. (Bt), Staten Island (Ds).

A. conditor Smith. Long Island (Ashm).

A. gracilis St. Farg. Jamesburg, VII, 11, Orange Mts., Ocean Co., Swedesboro, VII, 16 (Sm), Caldwell (Cr).

- A. gryphus* Smith. Jamesburg, VII, 11, Ocean Co. (Sm), Staten Island (Ds), Caldwell (Cr).
A. inepta Cress. "New York" (Ashm).
A. intercepta St Farg. New Jersey (Bt), Long Island (Ashm), Westville (Crn).
A. pictipennis Walsh. Staten Island (Ds).
A. procera Klug. New Jersey, probably.
A. urnaria Klug. Camden Co. (Fox), Caldwell (Cr).
A. violaceipennis St. Farg. New Jersey, probably.
A. vulgaris Cress. "New York" (Ashm).

Sub-family III **SCELIPHRONINÆ.**

SCELIPHRON Klug. = **PELOPÆUS** Latr.

- S. cementarius* Dru. Ocean Co., Sandy Hook, VII, New Brunswick, VI, South Jersey, VI, 2, Anglesea, Lahaway (Sm), Caldwell (Cr), Westville (Crn). This is the most common of our mud-daubers.
 var. *architectus* with type, and about as common.
 var. *canadensis* Smith. Staten Island, X (Ds).

CHALYBION Dahlb.

- C. cæruleum* Linn. New Brunswick, VII, 26, Lahaway, VI, 4, Jamesburg, VIII, 10, South Jersey, Orange Mts. (Sm).

—

Family XXVI AMPULICIDÆ.

Curious slender wasps, with a very long prothorax and a conic head, the base being in front, the clypeus like a beak. They are very rare and are said to prey on cockroaches.

RHINOPSIS Westw.

- R. canaliculata* Say. Should occur in New Jersey.

—

Super-family III VESPOIDEA.

Family XXVII POMPILIDÆ.

Rather slender, long-legged wasps with the abdomen united to the thorax by a very short stalk. They are usually velvety black or blue, often with orange

bands, wings usually black and kept in constant jerky motion when the insect is moving about. The species prey on spiders and may be diggers or makers of mud cells under stones, etc. A few are said to be guests in the nests of other diggers.

Sub family I PEPSINÆ.

PEPSIS Fabr.



Fig. 246.—*Tarantula hawk*, *Pepsis formosus* of the Southwest.

S. elegans St. Farg. New Jersey, probably.

SALIUS Fabr. = **PRIOCNEMIS** Schiödt.

S. alienatus Smith. Jamesburg (Sm), Camden Co., VIII, 24, IX, 7, Gloucester Co., IX, 29 (Fox).

S. conicus Say. Jamesburg, V, 4, New Brunswick (Sm), Camden Co., V, 18, Gloucester Co., V, 31, IX, 2 (Fox).

S. fortis Cress. New Jersey, probably.

S. fulvicornis Cress. Ocean Co. (Sm), Gloucester Co., VII, 19, VIII, 16, IX, 7 (Fox).

S. germanus Cress. Philadelphia, IX, 5, 14 (Fox).

S. nebulosus Dahlb. New Jersey, probably.

S. nuperus Cress. Philadelphia, VII, 10, Gloucester Co., IX, 2 (Fox).

S. pomileus Cress. Gloucester and Camden Cos., IX, 7, 21, New Jersey, VI, 1 (Fox).

S. unifasciatus Say. Gloucester Co., VII, 19, VIII, 16, Camden Co., VII, 26 (Fox).

Sub-family II POMPILINÆ.

POMPILUS Fabr.

- P. æthiops* Cress. Staten Island, IX (Ds), Caldwell (Cr).
P. algidus Smith. Ocean Co. (Sm), VII, 19 (Fox).
P. americanus Beauv. Camden Co., VI, 1, VII, 5, 21, Gloucester Co., IX, 12 (Fox), Caldwell (Cr), South Jersey, VII, 12 (Sm).
P. argenteus Cress. Camden Co., VI, 15 (Fox).
P. atramentarius Dahlb. Long Island (Ash).
P. atrox Dahlb. Ocean Co. (Sm), Staten Island (Ds), Caldwell (Cr), Camden Co., VI, 28, IX, 7, Gloucester Co., VIII, 16, IX, 21 (Fox).
P. biguttatus Fabr. South Jersey, VI, 2, Swedesboro, VII, 16 (Sm), Gloucester Co., VII, 22, VIII, 11, Camden Co., VII, 6 (Fox).
P. bipartitus St. Farg. New Jersey, probably.
P. brevicornis Cress. New Jersey, probably.
P. cinctipes Cress. Ocean Co., Camden Co., VI, 28 (Fox).
P. cylindricus Cress. Swedesboro, VII, 15 (Sm), Camden Co., VI, 15, VII, 6, 12, 19 (Fox).
P. divisus Cress. Camden Co., IX, 7 (Fox).
P. ephippiger Smith. Should occur in our State.
P. ferrugineus Say. Philadelphia, VII, 25, VIII, 9 (Fox).
P. funereus St. Farg. New Jersey, probably.
P. fuscipennis Lepel. Lahaway, VI, 16, VII, 1, Monmouth Co., VII, 4, Atlantic Co., VI, 29 (Sm), Camden Co., VII, 26, Gloucester Co., VII, 28 (Fox).
P. humilis Cress. New York to Texas (Ashm).
P. hyacinthenus Cress. Swedesboro, VII, 15, Gloucester Co., IX, 21 (Fox).
P. ingenuus Cress. Camden, IX, 7, Gloucester, VII, 19 (Fox).
P. interruptus Cress. Swedesboro, VII, 16 (Sm), Camden Co., VII, 5, 26, Gloucester Co., VIII, 10, IX, 21 (Fox).
P. marginatus Say. Lahaway, VIII, 2 (Sm), Staten Island, IX (Ds), Camden Co., VI, 15 (Fox).
P. maurus Cress. Ocean Co. (Sm), Gloucester Co., VIII, 24 (Fox).
P. posterus Fox. Camden Co., VII (Fox).
P. philadelphicus St. Farg. Gloucester Co., VII, 21, VIII, 16 (Fox).
P. relativus Fox. Ocean Co., Anglesea, VIII, Lahaway (Sm).
P. scelestus Cress. Should occur in New Jersey.
P. subviolaceus Cress. Ocean Co. (Sm), Atlantic Co., VI, 29, Camden Co., VIII, 24 and IX, 7 (Fox).
P. tenebrosus Cress. Camden Co., VII, 12, VIII, 10 (Fox).
P. tropicus Linn. South Jersey, VI, 2, VII, 12, Swedesboro, VII, 15, Jamesburg, VIII, 10, Anglesea, VII, 9 (Sm).

- P. maculipennis* Smith. New Jersey, probably.
P. nebulosus Dahlb. Should occur in New Jersey.
P. pompilius Cress. Recorded from New Jersey.
P. unifasciatus Say. Should occur in New Jersey.
P. virginiensis Cress. Monmouth Co., VII, 4 (Fox).

Sub-family III APORINÆ.

APORUS Spinola.

- A. fasciatus* Smith. Camden Co., VIII, 24 (Fox).

Sub-family IV AGENIINÆ.

AGENIA Schiödte.

- A. architecta* Say. Lahaway, VII, 3 (Sm).

- A. bombycina* Cress. Staten Island, V and VI (Ds), Camden Co., VII, 12 (Fox), Caldwell (Cr).

- A. calcarata* Cress. Should occur in New Jersey.

- A. caliptera* Say. Camden Co., VI, 28 (Fox).

- A. iridipennis* Cress. Camden Co., VI, 28, VIII, 3, Gloucester Co., V, 31 (Fox).

- A. mellipes* Say. Philadelphia, VII, 4 (Fox).

- A. pulchripennis* Cress. Pennsylvania.

- A. cœrulescens* Dahlb. Staten Island (Ds), Camden Co., VIII, 3, IX, 7 (Fox).

- A. subcorticalis* Walsh. "New Jersey," VIII, 31 (Ashm).

- A. varipes* Cress. Should occur in New Jersey.



Fig. 247.—*Agenia bombycina* and its cell, which is to be filled with spiders.

Sub-family V PLANICEPINÆ.

PLANICEPS Latr.

- P. niger* Cress. New Jersey, probably.

Sub-family VII CEROPALINÆ.

CEROPALES Latr.

- C. bipunctata* Say. Caldwell (Cr), Newark, Ocean Co. (Sm).
C. fraterna Smith. New Jersey, probably.
C. longipes Smith. New Jersey, probably.

Family XXVII VESPIDÆ.

These are the true social wasps, or "hornets," which live in colonies containing males, females and workers, the latter being, as in the bees, undeveloped females. All of them build paper cells or nests, some of them open and exposed like the common globular gray "hornet's nest" that is attached to bushes, some of them in trunks of trees and others under overhanging banks, under stones or in holes in the ground. The insects are pugnacious, as anyone who has ever disturbed a hornet or "yellow jacket's" nest has discovered to his cost. The food consists of other insects, of honey or of pollen; the larvæ being fed with masticated fragments of insects by the mother or workers. There is no storing of food here, and the larvæ are dependent upon the periodical feeding by adults. Only the impregnated females hibernate, and each of these starts a colony of its own in the spring. One of their notable structural characters is that when at rest the wings are folded longitudinally.

VESPA Linn.

- V. borealis* Kirby. Caldwell (Cr).
- V. crabro* Linn. Orange Mts., Anglesea, IX, 6, Monmouth Co., Lahaway, X, 5 (Sm), Caldwell (Cr), Staten Island (Ds). An imported species and much the largest that occurs with us.
- V. carolina* Dru. Ocean Co., V (Sm), Staten Island, VI (Ds).
- V. communis* Sauss. New Jersey, probably.
- V. cuneata* Fabr. = worker of *carolina* Dru., (Ashm). New Brunswick, VIII, 24 (Sm).
- V. diabolica* Sauss. Orange Mts., Lahaway, V, New Brunswick, VII, 3 (Sm), Westville (Crn), Jamesburg, VIII, 4, Atlantic Co., Staten Island, IX, Ft. Lee, VII (Ds).
- V. germanica* Fabr. Lahaway, IX, 16, New Brunswick, VIII, 3 (Sm), Caldwell (Cr), and throughout the State.
- V. infernalis* Sauss. "New Jersey."
- V. maculata* Linn. Common everywhere in the State: it is the usual white-faced wasp.
- V. occidentalis* Cress. "New Jersey," Philadelphia (Fox).
- V. pennsylvanica* Sauss. New Jersey, probably.
- V. vidua* Sauss. Lahaway (Sm), Brighton, Philadelphia, New York (Ashm), Westville (Crn).
- V. vulgaris* Linn. Jamesburg, VI, 16, Lahaway (Sm), Staten Island (Ds), Caldwell (Cr), Camden, VI, 20 (Fox).

POLISTES Latr.

These are the species that make the unprotected paper combs in sheltered situations.

- P. annularis* Linn. Jamesburg, VII, 21 (Sm), Staten Island, X (Ds).

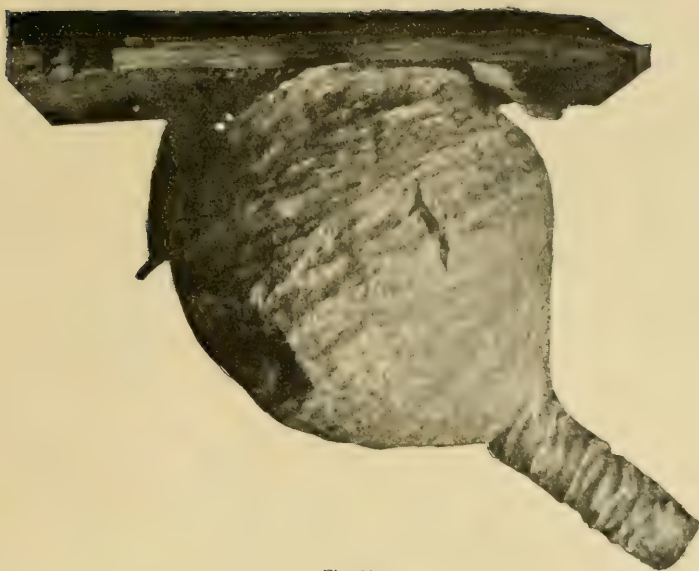


Fig. 249.



Fig. 248.



Fig. 250.

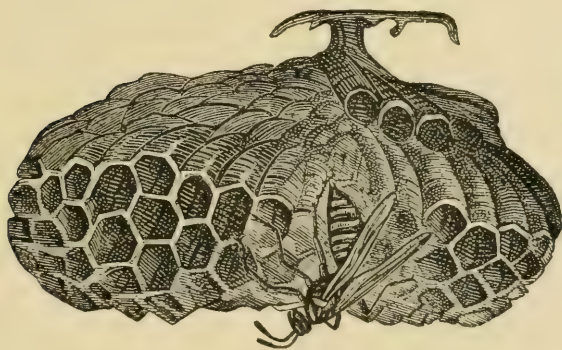


Fig. 251.

Fig. 248.—*Vespa maculata* ; white faced wasp.

Fig 249 —Nest of *Vespa maculata* just started.

Fig. 250.—*Polistes pallipes*.

Fig. 251.—Paper comb of *Polistes*

- P. fuscata* Fabr. New Jersey, probably.
P. instabilis Sauss. Rare in New Jersey (Bt).
P. metricus Say. Caldwell, III, 25 (Cr), and common everywhere in the State.
P. pallipes St. Farg. Common everywhere in the State.
P. perplexa Cress. The commonest form in my experience: June to October, New Brunswick, Jamesburg, Lahaway, Burlington Co., Anglesea (Sm).
P. rubiginosus St. Farg. "New Jersey," rare (Bt).
P. variatus Cress. Lahaway, IX, 22, Cape May Co., IX, 23, Camden Co., VII, 2 (Sm).
P. canadensis L. Staten Island, III, 15 (Ds).

Family XXIX EUMENIDÆ.

These are solitary wasps in which only males and females are developed. As in the preceding family the forewings are folded lengthwise when at rest. They are predatory and store their cells with insects of various kinds. They may be diggers, borers in pith or wood or may make mud nests which are often of symmetrical forms.

ZETHUS Fabr.

- Z. spinipes* Say. Caldwell (Cr), Orange Mts. (Sm).

EUMENES Latr.

- E. agilis* Sauss. Philadelphia, VIII, 1, 7 (Fox).

- E. fraternus* Say Jamesburg VII, 4, Orange Mts., VIII, Lahaway, IX, 22, Anglesea, IX, 6 (Sm), Caldwell (Cr), Staten Island, V, VIII (Ds), Monmouth Co., VIII, 4, Gloucester Co., VIII, 29 (Fox). This is the common "potter-wasp" that makes vase-like mud cells attached to low plants.

- E. globulosus* Sauss. "New Jersey" (Cress Coll)

- E. verticalis* Say. Camden, VIII, 3 (Fox).

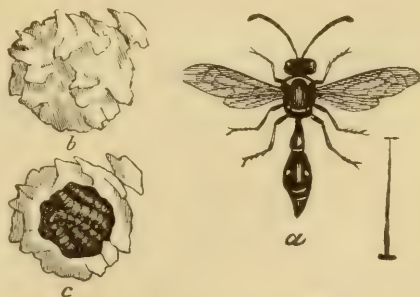


Fig. 252.—Fraternal potter-wasp, *Eumenes fraternus*: *a*, the wasp; *b*, its mud cell; *c*, same opened to show contents.

NORTONIA Sauss.

- N. symmorpha* Sauss. Caldwell (Cr).

ODYNERUS Latr.

- O. albomarginatus* Sauss. New Jersey, probably.
- O. albophaleratus* Sauss. Westville (Cr), Camden Co. (Fox), Canada to Colorado (Ashm).
- O. annulatus* Say. New Jersey (Bt).
- O. anormis* Say. Camden Co., VI, 28, VII, 12, Gloucester Co., VII, 5, 12 (Fox).
- O. arvensis* Sauss. Gloucester Co., VIII, 24 (Fox).
- O. birenimaculatus* Sauss. Staten Island (Ds), Jamesburg, VII, 4, rare (Sm).
- O. boscii* St. Farg. New Brunswick, VII, 24, Lahaway, Swedesboro, VII, 15 (Sm).
- O. campestris* Sauss. Jamesburg, New Brunswick, VI, 6, Swedesboro, VII, 15 (Sm), Staten Island (Ds).
- O. capra* Sauss. Bayside, X, 21, Orange Co., Atlantic Co., Middlesex, IX (Sm), Caldwell (Cr).
- O. catskillensis* Sauss. Lahaway, VI, 2 (Sm), Staten Island, VIII (Ds), Flatbush, V, 26, Philadelphia, IX, 11 (Ashm).
- O. conformis* Sauss. Gloucester Co., VII, 22, Philadelphia, IX, 5 (Fox).
- O. debilis* Sauss. Lahaway, VII, 12 (Sm).
- O. dorsalis* Sauss. Gloucester Co., VII, 15, Philadelphia, IX, 5, (Fox).
- O. foraminatus* Sauss. Camden Co., VI, 28; Gloucester Co., VII, 27, Philadelphia, IX, 28 (Fox), Caldwell (Cr), Westville (Crn).
- O. fulvipes* Sauss. Staten Island, VII (Ds), District of Columbia to Texas (Ashm).
- O. hidalgo* Sauss. Camden, VII, 12, 27 (Fox).
- O. huro* Sauss. New Jersey, probably.
- O. leucomelas* Sauss. Canada to Texas (Ashm).
- O. megæra* St. Farg. Caldwell (Cr), Camden, VI, 28, VII, 12 (Fox).
- O. ornatus* Sauss. Camden, VIII, 3 (Fox), Dunnfield, VII, 12, stores the larvæ of *Odontota dorsalis* (Sm).
- O. pedestris* Sauss. Caldwell (Cr), Cape May, VI, 14, Camden, VI, 24, VII, 12 (Fox).
- O. pennsylvanicus* Sauss. Westville (Cr), Camden, VI, 28, V, 18, VII, 5 (Fox).

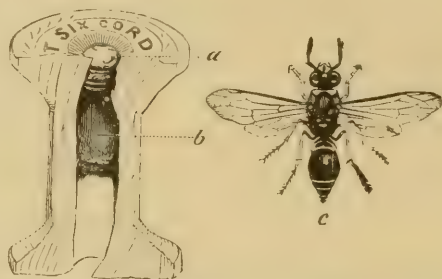


Fig. 253.—*Odynerus flavipes* and its nest built in a spool.

- O. perennis* Sauss. Gloucester Co., VIII, 10, Camden Co., VI, 15, VII, 12, Philadelphia, VI, 11, VII, 11, VIII, 17 (Fox).
O. philadelphiae Sauss. Caldwell (Cr).
O. quadrisectus Say. New Jersey, probably.
O. sæccularis Sauss. Lahaway, VI, 1, Jamesburg, VII, 15 (Sm), Gloucester Co., VII, 15, Philadelphia, VII, 23, VIII, 10 (Fox).
O. spinolæ Sauss. New Jersey, probably.
O. tigris Sauss. Lahaway, VI, 17, 24, New Brunswick, VII, 7 (Sm), Caldwell (Cr), Westville (Crn), Camden Co., IX, 5 (Fox).
O. unifasciatus Sauss. Caldwell (Cr), Gloucester Co., VII, 15 (Fox).
O. vagus Sauss. Gloucester Co., VII, 5, VIII, 12 (Fox).

MONOBIA Sauss.

- M. quadridens* Linn. Caldwell (Cr), Camden, VI, 28 (Fox), Newark, New Brunswick.

Family XXXI CHRYSIDIDÆ.

Sub-family II CHRYSIDINÆ.

These are the "cuckoo bees," so called because they lay their eggs in the cells of other bees or wasps, their larvæ depriving the rightful owner of food if they do not actually eat it first. These insects are of a brilliant metallic blue or green, with a very firm chitinous outer surface, which is often deeply punctured or otherwise sculptured. The abdomen has only a few visible segments, the others being in the form of a retractile tube, at the end of which the small sting is found.

Some species are said to be true parasites in saw-flies, and this would make the family beneficial on the whole.

Our collections in this family are not good, and an unusually large proportion of the species are listed because their general distribution is such that their occurrence in New Jersey admits of little doubt.

CHRYSIS Linn.

- C. cœruleans* Fabr. New Brunswick, South Jersey, Lahaway, VI, 24, VII, 18 (Sm).
C. frey-gessneri Grib. Should occur in New Jersey.
C. hilaris Dahlb. New Jersey, probably.
C. inæquidens Dahlb. Should occur in New Jersey.
C. intricata Brullé. New Jersey, probably.
C. nitidula Fabr. Westville (Fox).
C. nortoni Aaron. Pennsylvania.
C. parvula Fabr. Orange Mts. (Sm), Caldwell (Cr).



Fig. 254.—*Chrysis* species

- C. smaragdula* Fabr. Lahaway, VII, 12 (Sm).
C. tota Aaron. Should occur in New Jersey.
C. verticalis Patton. Riverton, VII, 31 (Jn).
C. doriæ Grib. Lahaway, VII, 18 (Sm).
C. perpulchra Cress. Camden Co., VII, 12 (Fox).

Sub-family III **HEDYCHRIINÆ.**

HEDYCHRIDIDIUM Perrin.

- H. dimidiatum* Say. Philadelphia (Jn).
H. viride Cress. New Jersey, probably.

HEDYCHRUM Latr.

- H. obsoletum* Say. "New Jersey," probably Camden, VI, 18 (U S N. M.).
H. violaceum Brullé. Anglesea, IX, 4, Gloucester Co., VII, 15, Camden Co. (Fox).

Sub-family IV **ELAMPINÆ.**

NOTOZUS Först.

- N. marginatus* Patt. New Jersey, probably.
N. viridicyaneus Norton. "New Jersey" (U S N M.).

OMALUS Panz.

- O. coruscans* Norton. Will probably occur in New Jersey.
O. iridescens Norton. Will probably occur in New Jersey.
O. læviventris Cress. Will probably occur in New Jersey.
O. sinuosus Say. Will probably occur in New Jersey.
O. semicircularis Aaron. Will probably occur in New Jersey.

Family XXXII BETHYLIDÆ.

Sub-family I **BETHYLIINÆ.**

PRISTOCERA Klug.

- P. atra* Klug. New Jersey, probably.
P. armifera Say. Van Courtland, N. Y., IX, 24 (Ashm).

ISOBRACHIUM Först.

I. myrmecophilum Ashm. Should occur in New Jersey.

CEPHALONOMIA Westw.

C. hyalinipennis Ashm. New Jersey, probably.

LÆLIUS Ashm.

L. trogodermatis Ashm. New Jersey, probably.

EPRIS Westw.

E. rufipes Say. New Jersey, probably.

MESITIUS Spinola.

M. bifoveolatus Ashm. New Jersey, probably.

ANOXUS Thoms.

A. chittendeni Ashm. New Jersey, probably.

GONIOZUS Först.

G. cellularis Say. New Jersey, probably.

G. platynotæ Ashm. New Jersey, probably.

Family XXXIII TRIGONALIDÆ.

TRIGONALYS Westwood.

T. sulcatus Davis. Anglesea (Sm).

LYCOGASTER Shuck.

L. pullator Shuck. Orange Mts., VII, 4 (Jn).

Family XXXIV SAPYGIDÆ.

SAPYGA Latr.

S. centrata Say. Camden Co., V, 18 (Fox). The species of this family are guests in the nests of bees and wasps.

Family XXXV MYZINIDÆ.**MYZINE Latr.**

- M. hamata* Say. Lakewood, Camden Co. (Ashm).
M. namea Fabr. Staten Island, VI and VIII (Ds), Westville (Crn).
M. marginata Say. New Jersey, probably.
M. obscura Fabr. Westville (Crn), "New Jersey," scarce (Bt).
M. sexcincta Fabr. Throughout the State, VII, VIII, IX; common.

Family XXXVI SCOLIIDÆ.

Stout, very hairy wasps, black, banded or spotted with yellow, legs short and strong, abdomen with a very short pedicel. The species burrow in the ground in search of white grubs, in which they lay their eggs and on which the larvae develop.

SCOLIA Fabr.

- S. bicincta* Fabr. Westville (Crn), Gloucester Co., VIII, 23, Philadelphia, IX, 4 (Fox).
S. dubia Say. Westville (Crn), Gloucester, VIII, 23 (Fox).
S. nobilitata Fabr. Camden Co., VI, 29, VII, 12, VIII, 3 (Fox).

ELIS Fabr.

- E. plumipes* Dru. Caldwell (Cr), Camden Co., V, 18, VII, 22 (Fox), Lahaway, Ocean Co., VI, VII (Sm)
E. quadrinotata Fabr. Monmouth Co., VII, 4 (Fox), throughout the pines, locally, in July.

Family XXXVII TIPHIIDÆ.

The only representative of this family in our State feeds in the larva of the May beetles, or common "white grubs" found in cultivated fields.

TIPHIA Fabr.

- T. inornata* Say. Jamesburg, Ocean Co., Gloucester Co., VII, 15 (Sm), Staten Island, VII, VIII (Ds), Caldwell (Cr), Atlantic Co., VI, 29, Camden Co., VI, 20, VIII, 24, IX, 7 (Fox).



Fig. 255.—White-grub parasite, *Tiphia inornata*:
 a, adult; b, head of larva; c, larva; d, cocoon.

Family XL THYNNIDÆ.**METHOCA** Latr.

M. bicolor Say. Camden Co., VI, 15, VII, 12, 26, Cape May, VI, 4 (Fox).

M. stygia Say. Ocean Co., VIII, 9 (Fox).

Family XLI MYRMOSIDÆ.**MYRMOSA** Latr.

M. unicolor Say. Camden Co., VIII, 9, IX, 29 (Fox).

M. thoracica Blake = female *unicolor* Say, (Ashm). Camden Co., VI, 28, (Fox).

Family XLII MUTILLIDÆ.

The females resemble ants in general shape, in being wingless and in being found running about among the grass in sandy spots. They are densely clothed with hair, however, and are contrastingly colored with black, yellow and orange, the name "velvet ants" being applied from their clothing. They differ from the ants in lacking the nodes at the base of the abdomen, and from our local species further in having a very long and very hot sting. The males are winged and occur on flowers, the wings being usually black in color. They are diggers, and while some of them are known to store food for their larvæ, others seem to be parasitic or guests in the nests and cells of bees or other wasps.

TIMULLA Ashm.

T. hexagona Say, male = *dubitata* Smith, female (Ashm) Westville (Crn), Atlantic Co., V, 29, Camden Co., VII, 22, 26, Gloucester Co., IX, 7 (Fox).

T. ornativentris Cress., female = *promethea* Blake, male (Ashm). Westville (Crn), Camden Co., VI, 28 (Fox).

EPHUTA Say.

E. scrupea Say, male = *parvula* Cress., female (Ashm). Camden Co., (Fox).

PSEUDOMETHOCA Ashm.

P. canadensis Blake, female = *S. cressonii* Fox, male (Ashm). Camden Co., V, 18, VII, 5, IX, 7 (Fox).

NOMIÆPHAGUS Ashm.

N. sanbornii Blake. Camden Co., VII, 10, IX, 7 (Fox).

N. simillima Smith. Camden Co., V, 8, VI, 15 (Fox).

PHOTOPSIS Blake.

P. pennsylvanica Lap., male = *pygmæa* Blake, female (Ashm). Camden Co., IX, 29 (Fox).

DASYMUTILLA Ashm.

D. occidentalis Linn. Camden Co., IX, 29, X, 20 (Fox), Westville (Crn).

SPHÆROPTHALMA Blake.

S. balteola Blake. Westville (Crn).

S. bexar Blake. Camden Co., VIII, 3 (Fox).

S. canella Blake. Camden Co., VII, 22, 27, Gloucester Co., VII, 22 (Fox).

S. cypris Blake. Westville (Crn), Camden Co., IX, 29, X, 20 (Fox).

S. fenestrata St. Farg. Camden Co., VII, 22 (Fox).

S. ferrugata Fabr. Camden Co., VII, 27, Gloucester Co., VII, 29 (Fox), Caldwell (Cr), Westville (Crn).

S. harmonia Blake. Occurs in the New Jersey district.

S. macra Cress. Camden Co., IX, 21, Gloucester Co., VII, 26, Atlantic Co., VI, 29, VII, 26, IX, 21 (Fox).

S. mutata Blake. Camden Co., IX, 29, X, 20 (Fox), Westville (Crn).

S. scæva Blake. Philadelphia, VII, 14 (Fox).

S. scævola Blake. Camden Co., V, 18 (Fox), Caldwell (Cr), Westville (Crn).

Super-family IV FORMICOIDEA.

These are the ants whose appearance is so commonly known that description seems hardly necessary. The structural character that separates them is the possession of one or two nodes or scales at the base of the abdomen, forming intermediate segments. They are usually social and form colonies, large or small, in which workers or undeveloped females predominate. These are wingless, but males and females are winged, the female losing these appendages soon after she starts a colony. The larvæ are helpless grubs which must be fed by food properly prepared by the workers. They make their nests in all sorts of places, some of them even inhabiting dwelling-houses, and they are almost omnivorous in feeding habits. None of our species are directly injurious to field crops, but many are indirectly harmful from their habit of protecting plant-lice by storing their eggs and colonizing the insects in spring upon a proper food plant. They may be thus considered injurious on the whole, and they do not in any case feed upon species that are injurious to the agriculturist.

Ants are the most intelligent among insects, and their habits are complicated, forming a most interesting study.

Where they infest houses they should be attracted to sponges dipped in sugar-water and laid near where they run: when a sponge becomes filled with the insects it should be thrown into boiling water and replaced by another. This sort of warfare kept up for a few days so demoralizes the ants that owing to the inexplicable disappearance of so many of their comrades they leave the house. Fresh bones serve as well as sponges, and should be burnt as soon as they become covered.

When ants infest lawns they can be cleaned out by pouring bisulphide of carbon into the main entrance or entrances. The heavy fumes follow the galleries and kill larvæ as well as adults: one application usually serving to destroy the hill. Where a hill is large, with many openings, three or four holes can be punched into it with a stick and the bisulphide poured into them—an ounce or two in each. Then close the holes by stepping on them, or in any other way.

Our collections are extremely incomplete.

Family XLIV PONERIDÆ.

There is only one segment in the peduncle between thorax and abdomen, the space between the third and fourth segments is constricted, and the females are furnished with a sting. The species are mostly rare.

STIGMATOMMA Roger.

S. pallipes Hald. Gloucester, Westville, under bark, rare (Fox).

SYSPHINCTA Roger.

S. pergandei Em. Pennsylvania (Ashm).

PONERA Latr.

P. coarctata Latr. Philadelphia, IV, 20, Camden and Gloucester Co. (Fox).

P. gilva Roger. Should occur in New Jersey.

P. pennsylvanica Buck. Pennsylvania (Ashm).

DISCOTHYREA Roger.

D. testacea Roger. Should occur in New Jersey.

PROCERATIUM Roger.

P. silaceum Rog. Pennsylvania (Ashm).

Family XLV MYRMICIDÆ.

The species have the peduncle between thorax and abdomen two-jointed. The females and workers have a sting, but in most of our species it is small and rarely used.

CREMASTOGASTER Lund.

C. læviuscula Mayr. Virginia to Florida.

C. lineolata Say. Caldwell (Cr), Atlantic Co., VI, 29 (Bt); a common species throughout the State.

var. *lutescens* Em. New Jersey (Ashm).

var. *cerasi* Fitch. New Jersey (Ashm).

var. *pilosa* Perg. New Jersey (Ashm).

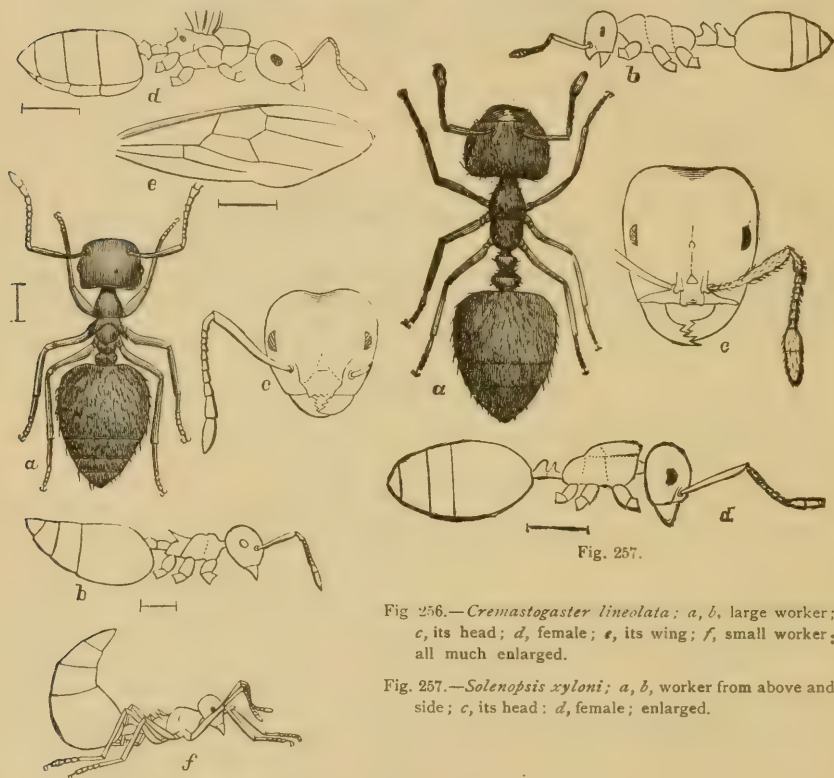


Fig. 256.

Fig. 257.

Fig. 256.—*Cremastogaster lineolata*: *a*, *b*, large worker; *c*, its head; *d*, female; *e*, its wing; *f*, small worker; all much enlarged.

Fig. 257.—*Solenopsis xyloni*: *a*, *b*, worker from above and side; *c*, its head; *d*, female; enlarged.

SOLENOPSIS Westw.

S. debilis Mayr. Recorded from New Jersey.

S. fugax Latr. Caldwell (Cr).

S. geminata Fabr. Pennsylvania to Florida (Ashm).

TETRAMORIUM Mayr.

T. cæspitum Linn. Should occur in New Jersey.

MYRMECINA Curtis.

M. latreillii Curtis. Should occur in New Jersey.

MONOMORIUM Mayr.

M. minutum Mayr. Long Island: makes its nest in a gall.

M. molesta Say. New Jersey, probably.

M. pharaonis Linn. Throughout the State commonly. This is the small red ant that is usually found in houses.

LEPTOTHORAX Mayr.

L. canadensis Prov. New York.

L. longispinosus Roger. New Jersey (Em).

L. schaumii Roger. Pennsylvania (Em).

PHEIDOLE Westw.

P. morrisi Forel. New Jersey, probably.

P. pilifera Roger. New Jersey and Pennsylvania (Em).

P. pennsylvanica Roger. Should occur in New Jersey.

P. vinelandica Forel. Camden Co, VIII, 20 (U S N M), Vineland (Forel).

MYRMICA Latr.

M. corrugata Say. New Jersey district.

M. dimidiata Say. Probably New Jersey.

M. lævinodis Nyl. New Jersey, probably.

M. minuta Say. Probably New Jersey.

M. opposita Say. New Jersey, probably.

M. lobicornis Nyl. New Brunswick, VII, 20, Lahaway, May.

M. punctiventris Roger. Recorded from Camden, New Jersey.

M. rubra L. Occurs throughout the State.

var. *brevinodis* Em. New York (Em).

var. *subuleti* Meinert. New Jersey (Em).

var. *schencki* Em. New Jersey (Em).

M. scabrinodis Nyl. Caldwell (Cr), Camden, Staten Island, nest in grass stems supported by stones in wet places (Ds).

M. sulcinodis Nyl. Recorded from New Jersey.



Fig. 458.—*Monomorium pharaonis*: much enlarged.

STENAMMA Westw.

S. westwoodi Westw, subsp. *diecki* Emery. Pennsylvania.

S. brevicorne Mayr: Pennsylvania (Em).

APHÆNOGASTER Mayr.

A. fulva Roger. Caldwell (Cr).

var. *picæa* Emery. New York, New Jersey (Em).

A. pennsylvanica Buck. New Jersey, probably.

A. treatæ Forel. Recorded from Vineland.

A. tennesseene Mayr. Pennsylvania, New York (Em).

POGONOMYRMEX Mayr.

P. badius Latr., nec Mayr. Caldwell (Cr).

Family XLIV CRYPTOCERIDÆ.

The antennæ are inserted in the sides of the head where they are placed between ridges or into a groove into which they can be withdrawn.

STRUMIGENYS F. Smith.

S. pergandei Em. Pennsylvania (Em).

S. pulchella Em. Pennsylvania (Em).

S. clypeata Em. Pennsylvania (Em).

ATTA Fabr.

A. tardigrada Buck. New Jersey (Em).

Family XLVIII DOLICHODERIDÆ.

There is only a single segment in the peduncle between thorax and abdomen. Sting of female rudimentary.

DOLICHODERUS Lund.

D. mariæ Forel. Jamesburg, VII, 4, 15, Monmouth Co, VII (Sm).

D. pustulatus Mayr. New Jersey (Em).

D. plagiatus Mayr. Monmouth Co., VII, 4, Jamesburg, VII, 4 (Fox).

TAPINOMA Forst.

T. sessile Say. Camden Co., VIII, 23, South Jersey, common (Fox), Caldwell (Cr), throughout the State.

DORYMYRMEX Mayr.

D. pyramicus Roger. South Jersey, common.

Family XLIX FORMICIDÆ.

These ants have only one segment in the peduncle between thorax and abdomen, no constriction between the abdominal segments and no sting in the females and workers. They are the most common of our species.

CAMPONOTUS Mayr.

C. castaneus Latr. Caldwell (Cr).

C. pennsylvanicus DeGeer. Caldwell (Cr). This is the large black carpenter ant that occurs throughout the State in stumps, logs and dead branches of trees.

C. lateralis Oliv. New Jersey, probably.

C. gagates Latr. New Jersey, probably.

C. marginatus Latr. Camden Co (Fox), Caldwell (Cr).

var *nearcticus* Em. Pennsylvania, New York (Em).

var *minutus* Em. New Jersey (Em).

C. noveboracensis Fitch. Vineland (Ashm).

C. melleus Say. Staten Island, nest made under stones (Ds).

C. pictus Forel. Camden Co. (Fox).

PLAGIOLEPIS Mayr.

P. longicornis Latr. Common in houses in New York (Pergande).

BRACHYMYRMEX Mayr.

B. heeri Forel. New Jersey (Em).

PRENOLEPIS Mayr.

P. imparis Say. New York (Em), Caldwell (Cr), Camden Co., VIII, 23, South Jersey, common (Fox).

P. vividula Nyl. New Jersey, probably.

LASIUS Fabr.

- L. brevicornis* Emery. "New Jersey" (Em).
L. brunneus Latr. This is the ant that gathers and stores the eggs of the corn-root louse in winter, colonizing the aphid upon the roots in spring.
L. flavus DeG. Caldwell (Cr), New Jersey (Em).
L. niger Linn. Caldwell (Cr).
L. umbratus Nyl. Caldwell (Cr).
 var. *mixtus* Nyl. "New Jersey" (Em).
 var. *minutus* Em. "New Jersey" (Em).
L. speculiventris Em. "New Jersey" (Em).
L. alienne Först. Lahaway, May (Sm).

ACANTHOMYOPS Mayr.

- A. claviger* Rog. Caldwell (Cr), "New Jersey" (Em), Camden County, VIII, 1 (Jn).
A. latipes Walsh. "New Jersey" (Em), Camden County.
A. interjectus Mayr. Caldwell (Cr).

FORMICA Linn.

- F. exsectoides* Forel. "New Jersey" (Em), Philadelphia.
F. fusca Linn. Caldwell (Cr), New Brunswick, VII, 20 (Sm), Staten Island (Ds).
 var. *subænescens* Em. New Jersey (Em).
 var. *neogates* Em. Pennsylvania, New York (Em).
F. integra Nyl. Caldwell (Cr); Philadelphia, IV, 14 (U S N M), is one of the slave-making ants (Ds).
F. occidentalis Buck. New Jersey, probably.
F. rufa Linn. Caldwell (Cr), not uncommon throughout the State.
 var. *obscuriventris* Mayr. New Jersey (Em).
F. sanguinea Latr. Camden County, VII, 12, "New Jersey" (Cress, Coll).
 var. *rubicauda* Emery. Pennsylvania (Em).
 var. *subintegra* Emery. New Jersey (Em).
 var. *obscuripes* subsp. *difficilis* Emery. New Jersey (Em).
F. pallidefulva Latr. "New Jersey," Camden Co., VII, (Fox).
 var. *schaufussi* Mayr. Caldwell (Cr), New Jersey (Em), Camden Co., VII, 7, DaCosta (Fox).
 var. *incerta* Em. New Jersey (Em).
F. rubibarbis Fabr. Philadelphia (Fox).

POLYERGUS Latr.

- P. rubescens* Latr., subsp. *lucidus* Mayr. Camden Co., VI, 28, Clementon, rare (Fox).

Super-family V PROCTOTRYPOIDEA.

With this series begin the parasitic species, a large proportion of which are directly beneficial because of their habit of feeding in or on the tissues of injurious species. As a whole these parasitic forms are known by having the trochanter or hip segment of the hind legs made up of two parts; but this is a character so difficult of detection on the usually small species that it is, on the whole, safer to class all very small specimens of this order as members of a parasitic series. In this super-family we find the very smallest of the Hymenoptera, and all of them are parasitic so far as I know. They infest not only larvæ but adults and even eggs of other insects, forming thus a most important check to the increase of the host insects. In this series the ovipositor is retractile into and comes from the tip of the abdomen.

Our collections are decidedly poor, and the list is in consequence very incomplete. No special collecting has ever been done in the State, and breeders of insects of other orders have usually permitted the escape of the parasites bred by them incidentally.

Family L PELECINIDÆ.**PELECINUS Latr.**

P. polyturator Dru. Occurs throughout the State quite commonly. This is a remarkable insect, the female of which has a body nearly two inches long, made up of a few long, slender segments. The male is very rare and utterly unlike the female, resembling more nearly a wasp than a parasite.

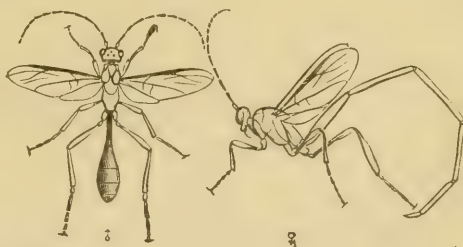


Fig. 259.—*Pelecinus polyturator*; male and female.

Family LI HELORIDÆ.**HELORUS Latr.**

H. paradoxus Prov. New York (Ashm).

Family LII PROCTOTRYPIDÆ.

PROCTOTRYPES Latr.

- P. caudatus* Say. Philadelphia (Jn).
P. linellii Ashm. Long Island (Ashm).
P. abruptus Say. New Jersey district.
P. obsoletus Say. New Jersey district.
-

Family LIII BELYTIDÆ.

LEPTORHAPTUS Först.

- L. conicus* Ashm. New Jersey district.

BELYTA Jur.

- B. frontalis* Ashm. New Jersey district.

XENOTOMA Först.

- X. xanthopus* Ashm. New Jersey district.
-

Family LIV DIAPRIIDÆ.

PARAMESIUS Westw.

- P. terminatus* Say. New Jersey district.

GALESUS Curtis.

- G. politus* Say. New Jersey district.

TROPIDOPIA Ashm.

- T. conica* Fabr. New Jersey district.

DIAPRIA Latr.

- D. meromyzæ* Fitch. Parasite on *Meromyza americana*, the wheat stem maggot.

TRICHOPRIA Ashm.

- T. carolinensis* Ashm. New Jersey district.

Family LV CERAPHRONIDÆ.**LYGOCERUS** Först.

L. stigmatus Say. Parasite on poplar Aphis (Ashm).

L. niger How. South Jersey, parasitic on wheat louse, VI, 4, VII, 10 (Sm).

CERAPHRON Jur.

Fig. 260.—*Lygocerus niger*: wheat louse parasite: much enlarged.

C. fusciceps Ashm. New Jersey district.

C. basalis Ashm. New Jersey district.

Family LVI SCHELIONIDÆ.**TELENOMUS** Hal.

T. bifidus Riley. New Jersey district.

T. orgyiae Fitch. In eggs of *Orgyia leucostigma*, the vaporier moth

TRISSOLCUS Ashm.

T. podisi Ashm. Ocean Co., May (Sm).

PROSACANTHA Nees.

P. linellii Ashm. Long Island (Ashm).

P. marylandica Ashm. Ocean Co. (Sm).

CALOTELEIA Westw.

C. marlattii Ashm. New Jersey district.

BARYCONUS Först.

B. cecanthi Ashm. Parasite on *Cecanthus*, or tree crickets.

Family LVII PLATYGASTERIDÆ.

ANOPEDIAS Först.

A. error Fitch. New York to Ohio (Ashm).

AMITUS Hald.

A. aleurodinis Hald. Pennsylvania, District of Columbia, Illinois (Ashm).

POLYGNOTUS Först.

P. diplosidis Ashm. New Brunswick, bred from the blackberry midge (Sm).

P. pinicola Ashm. Clementon, V, 27 (Jn).

ISOCYBUS Först.

I. pallipes Say. Ocean Co, May (Sm).

Super-family VI CYNIPOIDEA.

The insects of this series are the gall-wasps, or gall-flies, and they are largely parasitic upon plants, though many of them, belonging mainly to the *Figitidae*, are true parasites upon other insects. Some of them are also guests, orinquilines, inhabiting galls formed originally by other species. Hence it is not unusual for one to breed from a large, multicellular gall several species of minute Hymenoptera. the true gall-maker in small numbers, the guests and parasites sometimes in great quantity. The galls are abnormal plant growths produced by the irritation of the minute larva upon the plant tissue, and each species produces its own peculiar gall so that classification is possible from these abnormal growths as readily as from the insects themselves. The grubs do not feed upon the actual gall tissue, but lie in cells in the gall, apparently subsisting upon material secreted from the inner walls. A gall may have only one larval cell and is then unicellular, or it may have a great many and is then multicellular.

The ovipositor in this series is partly coiled within the abdomen which is

usually much dilated or enlarged posteriorly. The life cycle of these insects is often very curious and parthenogenesis is of frequent occurrence. In some species there is good reason to believe that males have been entirely eliminated. None of the species are really harmful and few of them are notably beneficent.

Family LVIII FIGITIDÆ.

Sub-family I FIGITINÆ.

FIGITES Latr.

T. canadensis Ashm. Canada, Long Island (Ashm).

SOLENASPSIS Ashm.

S. armatus Say. "New Jersey" (Ashm).

Sub-family II ONYCHIINÆ.

ONYCHIA Hal.

O. provancheri Ashm. New York, Canada (Ashm).

Sub-family III ANACHARINÆ.

ANACHARIS Dalm.

A. marginata Prov. New York, Canada, Illinois (Ashm).

Sub-family V EUCCELINÆ.

EUCCELA Westw.

E. pedata Say. New Jersey district.

E. stigmata Say. Jamesburg, VII, 15 (Sm).

COTHONASPIS Ashm.

C. erythropus Ashm. Jamesburg, VI (Sm).

PSILODORA Forst.

P. impatiens Say. Jamesburg, VII, 15 (Sm).

Sub-family VI ALLOTRIINÆ.

ALLOTRIA Westw.

A. avenæ Fitch. New Jersey district.

A. tritici Fitch. New Brunswick, VII, 20 (Sm).

Family LIX CYNIPIDÆ.**Sub-family I SYNERGINÆ.****PERICLISTUS** Först.

P. sylvestris O. S. New Brunswick (Sm).

P. pirata O. S. = *Rhodites globulus* Beut. Staten Island (Bt, Ds), on
Rosa carolina.

CEROPTRES Hartig.

C. petiolicola O. S. "New Jersey" (Bt)

C. tuber Fitch. New Brunswick, Monmouth Junction, IV, 8, common (Sm),
New Jersey (Bt).

C. pisum Fitch. "New Jersey," common (Bt).

C. ficus Fitch. "New Jersey" (Bt), New Brunswick (Sm).

SYNERGUS Hartig.

S. campanula O. S. New Jersey, probably.

S. dimorphus O. S. New Jersey, probably.

S. læviventris O. S. New Brunswick (Sm).

S. lana Fitch. "New Jersey" (Bt).

S. lignicola O. S. New Jersey, probably.

S. mendax Walsh. New Jersey, probably.

S. oneratus Harris. New Brunswick (Sm).

Sub-family II CYNIPINÆ.**XYSTOTERAS** Ashm.

X. nigra Fitch. New Jersey district.

PHILONIX Fitch. = **ACRASPI** Mayr.

P. fulvicollis Fitch. New Jersey district.

P. nigricollis Fitch. New Jersey district.

P. macrocarpæ Bass. New Jersey district.

P. prinoides Beut. On upper side leaves of chestnut oak, Toms River (Bt).

P. hirta Bass. On *Q. ilicifolia*, "New Jersey" (Bt).

ZOPHEROTERAS Ashm.

Z. vaccinii Ashm. Canada to Florida (Ashm).

XANTHOTERAS Ashm.

X. forticornis Walsh. New Jersey district.

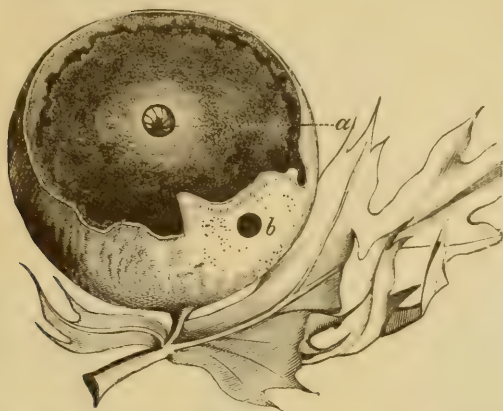


Fig. 261.—*Cynips q-spongifica*, gall on oak; *a*, larva in its cell; *b*, point of exit.

DOLICHOSTROPHUS Ashm.

D. irregularis O. S. On white oak leaves.

NEUROTERUS Hartig.

N. saltatorius H. Edw. On leaves of *Q. alba* (Ashm).

N. batatus Fitch. On twigs of *Q. alba* (Ashm), Jamesburg, New Brunswick (Sm).

N. noxiosus Bass. On terminal twigs of *Q. bicolor* (Bt), white oak, New Brunswick (Sm), Staten Island (Ds).

N. verrucarum O. S. On leaves *Q. macrocarpa*, New Jersey (Bt).

N. floccosus Bass. Under side of leaves *Q. bicolor* (Bt).

N. flavosus Bass. Under side of leaves *Q. bicolor*, Ft. Lee dist. (Bt), Staten Island (Ds).

LOXAULUS Mayr.

L. mammula Bass. New Jersey district.

DRYOPHANTA Först.

D. polita Bass. On leaves post oak, Toms River (Bt), and recorded from New Jersey.

D. papula Bass. Toms River (Bt).

D. ignota Bass. "New Jersey" (Bt).

HOLCASPIS Mayr.

H. globulus Fitch. New Brunswick, Monmouth Junction on white oak (Sm).

H. rugosa Bass. New Jersey district.

CYNIPS Linn.

- C. strobilana* O. S. On leaves of swamp oak, New Jersey (Bt), Del. Water Gap, VII, 12 (Sm).

AMPHIBOLIPS Reinh.

- A. ilicifoliæ* Bass. On leaf petiole of *Q. ilicifolia*, Vineland, VI (Bt), Staten Island (Ds).
- A. inanis* O. S. Ft. Lee on leaves of Scarlet Oak (Bt), Staten Island (Ds), Del. Water Gap, VII, 9 (Jn).
- A. confluens* Harris. Caldwell (Cr), on leaves of *Q. palustris*, common (Bt), Staten Island (Ds).
- A. cœlebs* O. S. Staten Island, on *Q. coccineæ* (Ds).
- A. prunus* Walsh. On the sides of acorns in September, red and black oaks, Fort Lee (Bt).
- A. hubilipennis* Harris. New Jersey district.



Fig. 262.—*Amphibolips inanis*: gall, showing the rayed structure.

CALLIRHYTIS Först.

- C. clavula* Bass. On white oak, New Brunswick, Monmouth Junction (Sm), "New Jersey" (Bt).
- C. cornigera* O. S. Widely distributed in Middle States (Ashm).
- C. operator* O. S. Staten Island (Ds).
- C. seminator* Harris. On *Q. alba* throughout New Jersey (Sm).
- C. futilis* O. S. On leaves *Q. alba*, imago, VI, VII (Bt), Staten Island (Ds) Jamesburg, Lahaway, common (Sm).
- C. punctata* Bass. On red, black, scarlet and scrub oaks, common (Bt). Staten Island (Ds), New Brunswick (Sm).
- C. tubicola* O. S. On *Q. obtusiloba*, "New Jersey" (Bt).
- C. similis* Bass. At ends of small limbs of *Q. ilicifolii*, Toms River (Bt). Staten Island (Ds).

ANDRICUS Hartig.

- A. osten-sackenii* Bass. "New Jersey" (Bt).
- A. papillatus* O. S. On leaves chestnut oak, *Q. prinus* (Bt).
- A. singularis* Bass. On leaves red oak, imago in July (Bt), Staten Island (Ds).
- A. chinquapin* Fitch. New Jersey district.
- A. fusiformis* O. S. New Jersey district.

- A. flocci* Walsh. South Jersey, under side leaves of *Q. alba*, common (Bt).
A. petiolata Bass. Base of leaf and midrib on various oaks, common (Bt), Staten Island (Ds).
A. singularis Bass. Ft. Lee (Bt).

SOLENOZOPHERIA Ashm.

- S. vaccinii* Ashm. Canada to Florida (Ashm).

DIASTROPHUS Hartig.

- D. cuscuteformis* O. S. On blackberry, *Rubus villosus* (Bt).
D. nebulosus O. S. New Jersey on blackberry, very common locally.
D. radicum Bass. "New Jersey," scarce (Bt), occurs on roots of Rosacea.
D. similis Bass. New Jersey district.
D. bassettii Beut. On trailing blackberry, *Rubus canadensis* (Bt).

AULACIDEA Ashm.

- A. mulgicicola* Ashm. New Jersey district.
A. tumidus Bass. Staten Island (Ds), on main stalk of wild lettuce, *Lactuca* (Bt).

RHODITES Hartig.

- R. bicolor* Harr. New Jersey, common (Bt), the most usual rose gall.
R. dichlocerus Harr. On *Rosa Carolina*, New Jersey (Bt), Staten Island (Ds), Caldwell (Cr).
R. ignota O. S. On *Rosa carolina* in September, New Jersey (Bt), Staten Island (Ds).
R. radicum O. S. On roots wild roses (Bt), Staten Island (Ds).
R. rosæ Linn. On roses and blackberry, New Jersey (Bt), Staten Island (Ds).
R. verna O. S. On *Rosa lucida*, New Jersey (Bt), Staten Island (Ds).

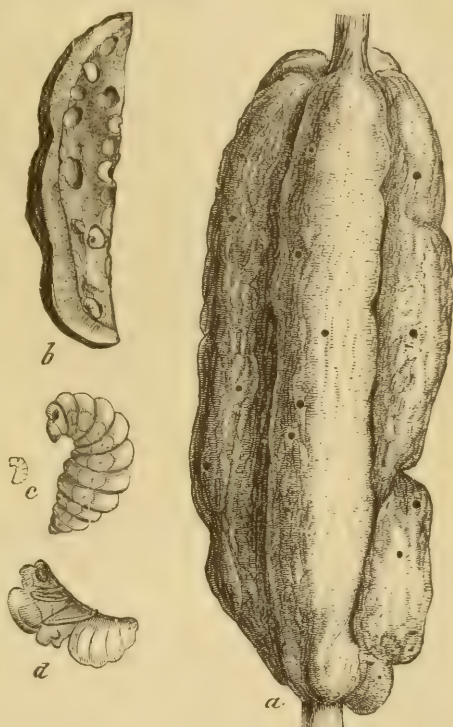


Fig. 263.—Blackberry pithy gall, *Diastrophus nebulosus*;
a, gall showing exit holes of adult, natural size;
b, section through same showing the cells;
c, larva, enlarged; *d*, pupa, enlarged.

Sub-family III IBALIINÆ.

IBALIA Latr.

I. ensiger Norton. New Jersey district.

I. maculipennis Hald. New Jersey district.

Super-family VII CHALCIDOIDEA.

The largest number of our parasites belong to this series, and they are usually rather stout species with broad heads, elbowed antennæ and more or less metallic colors. The color character is not universal by any means, yet many of our most common species are recognizable by it, while green, blue or metallic species may be, in most cases, safely referred here. A very good example is the minute species that can be had in great quantities from the chrysalis of the common cabbage butterfly. The wings have few or no veins, are often clothed with short hairs, and occasionally wanting altogether in one sex or both. The ovipositor is more or less concealed, and usually issues from the under side of the abdomen before the tip.

A proportionally small number of the species are plant-feeders, and some of these, like the "joint-worms," are occasionally injurious. Others are hyperparasites, or prey upon other species that are themselves parasitic in habit, thus acting as checks to the increase of primary parasites.

Family LXI TORYMIDÆ.

Sub-family II TORYMINÆ.

SYNTOMASPIS Först.

S. vaccinariæ Ashm. Common in various *Cynips* galls (Ashm).

S. advena O. S. New Brunswick in oak galls (Sm).

TORYMUS Dalm.

T. cœruleus Ashm. New Brunswick, bred from blackberry galls (Sm).

T. sackenii Ashm. New Brunswick (Sm).

T. æa Wlk. New Jersey, probably.

T. chrysochlora O. S. Probably New Jersey.

T. harrisii Fitch. New York.

T. tubicola O. S. New Jersey, probably.

T. flavicoxa O. S. New Brunswick, VII, 20 (Sm).

Sub-family III MONODONTOMERINÆ.

MONODONTOMERUS Westw.

M. entechniæ Ashm. Philadelphia (Jn).

DIOMORUS Wlk.

D. zabriskii Cress. Parasite in nest of *Ceratina dupla* (Ashm).

Sub-family IV MEGASTIGMINÆ.

MEGASTIGMUS Dalm.

M. candensis Ashm. Probably occurs in New Jersey.

Sub-family V ORMYRINÆ.

ORMYRUS Westwood.

O. querci-pilulæ Fitch. New York.

O. vaccinicola Ashm. Probably occurs in New Jersey.

O. ventricosus Ashm. New Brunswick (Sm).

O. minutus Ashm. New Brunswick (Sm).

Family LXII CHALCIDIDÆ.

Sub-family I LEUCOSPIDINÆ.

LEUCOSPIS Fabr.

L. affinis Say. Caldwell (Cr), "New Jersey" (Cress Coll), Westville (Fox).

Sub-family II CHALCIDINÆ.

PHASGONOPHORA Westw.

P. sulcata Westw. Merchantville, VII, 14 (Jn).

CHALCIS Fabr.

C. flavipes Fabr. "New Jersey" (Cress Coll).

C. ovata Say. Clementon, VIII, 6 (Jn).

SMICRA Spin.

S. braccata Sanb. Caldwell (Cr), Clementon, VIII, 6 (Jn).

S. igneoides Kirby. Likely to occur in New Jersey.

- S. maculata* Fabr. New Jersey, probably.
S. mariæ Riley. Central and Eastern U. S. (Crn).
S. microgaster Say. Cape May, VI, 22 (Jn).
S. nigrifex Wlk. New Jersey, probably.
S. nortonii Cress. Newark, from *Limacodes* larva (Sm), Anglesea, VIII, 13 (Jn).
S. torvina Cress. Jamesburg, New Brunswick, VII (Sm), Cramer Hill, V, 21 (Jn).

Family LXIII EURYTOMIDÆ.

DECATOMA Spin.

- D. hyalipennis* Walsh. New Jersey, probably.
D. varians Walsh. New Brunswick (Sm).

EUDECATOMA Ashm.

- E. querci-lanæ* Fitch. New Brunswick (Sm).
E. dorsalis Fitch. New Brunswick (Sm).

EURYTOMA Illig.

- E. bolteri* Riley. New Brunswick, VII, 20 (Sm).
E. bicolor Walsh. Jamesburg, VII, 15 (Sm).
E. diastrophii Walsh. Newark, V, New Brunswick (Sm).
E. lanulæ Fitch. New York.
E. studiosa Say. Pennsylvania.
E. querci-globuli Fitch. New York.
E. querci-pisi Fitch. New York.
E. auriceps Walsh. New Brunswick (Sm).

EUOXYSOMA Ashm.

- E. vitis* Saund. Lives in grape seed (Saund).

ISOSOMA Walk.

- I. hordei* Harr. Lives in grain: one of the joint worms.
I. tritici Riley. Also one of the joint worms. These species have never been injurious in New Jersey and can be easily controlled by using up all the straw completely during the winter.

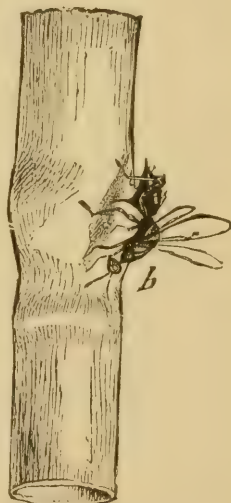


Fig. 264. — Female *Isosoma* ovipositing in stem of wheat: enlarged.

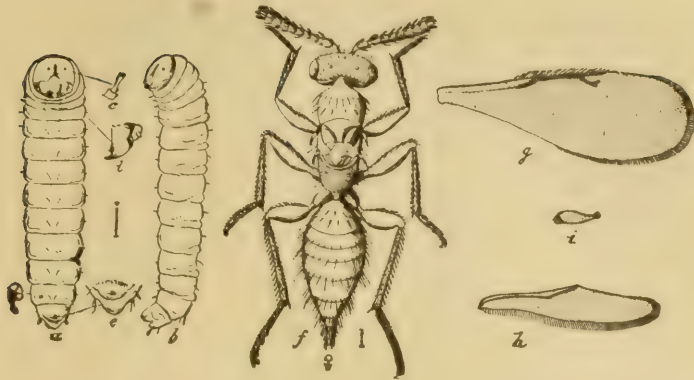


Fig. 265.—*Isosoma tritici*; *a*, *b*, larva; *f*, female; *g*, fore wing; *h*, hind wing; other letters refer to details: all much enlarged.

RILEYA Ashm.

R. cecidomyiæ Ashm. On Cecidomyid galls (Ashm).

MACRORILEYA Ashm.

M. œcanthi Ashm. Parasite in eggs of tree crickets (Ashm).

BRUCHOPHAGUS Ashm.

B. funebris How. Ocean Co., V, New Brunswick, VII (Sm).

AXIMA Walk.

A. zabriskiei How. New York, parasite in nest of *Ceratina dupla* (Ashm).

Family LXIV PERILAMPIDÆ.

PERILAMPUS Latr.

P. cyaneus Brullé. Westville, VII, 21 (Jn).

P. hyalinus Say. Caldwell (Cr).

P. triangularis Say. Atco, VI, 13 (Jn).

P. violaceus Dalm. New Jersey, probably.

LXV Family EUCHARIDÆ.

PSEUDOMETAGEA Ashm.

P. schwarzii Ashm. Pennsylvania, Maryland, Illinois (Ashm).

Family LXVI MISCOGASTERIDÆ.

Sub-family I PIRENINÆ.

EUNOTUS Walk.

E. lividus Ashm. New York to Georgia (Ashm).

Sub-family II TRIDYMINÆ.

TRIDYMUS Ratz.

T. metallicus Ashm. In willow galls (Ashm).

HABRITUS Thoms.

H. nubilipennis Ashm. New Brunswick (Sm).

Family LXVII CLEONYMIDÆ.

Sub-family II CLEONYMINÆ.

EPISTENIA Westw.

E. osmiæ Ashm. Parasitic on bees, *Osmia* sp. (Ashm).

PTINOBIUS Ashm.

P. magnificus Ashm. New Jersey, probably.

CHIROPACHYS Westw.

C. colon Linn. A parasite on the fruit bark beetle.

Family LXVIII ENCYRTIDÆ.

Sub-family I EUPELMINÆ.

ARACHNOPHAGA Ashm.

A. picea Riley. In egg cocoons of spider, *Epeira globosa*.

ANASTATUS Mots.

A. mirabilis Walsh. Widely distributed over the United States from the Atlantic to the Pacific (Ashm).

METAPELMA Westw.

- M. spectabilis* Westw. U.
S. from Atlantic to Pa-
cific (Ashm).

EUELMUS Dalm.

- E. allynii* French. Common
in wheat fields, Clemen-
ton, V, 22 (Jn).

- E. cyaneiceps* Ashm. New
Brunswick (Sm), Cra-
mer Hill, VI, 11 (Jn).

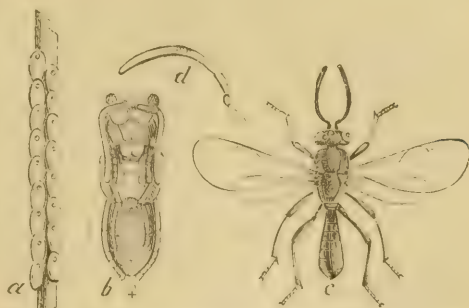


Fig 266 — Eueumid, parasite on eggs of katydid: *a*, eggs from which parasite has issued, natural size; *b*, pupa, and *c*, adult, enlarged.

Sub-family II ENCYRTINÆ.**Tribe I Euscapini.****MEROMYZOBIA** Ashm.

- M. maculipennis* Ashm. Parasite in wheat stem maggot, *Meromyza* sp. (Ashm).

Tribe II Comysini.**COMYS** Först.

- C. bicolor* How. New Jersey district.
C. fusca How. New Jersey district.

Tribe III Encyrtini.**COPIDOSOMA** Ratz.

- C. gelechiæ* How. Should occur in New Jersey.
C. intermedium How. Recorded from New Jersey.
C. truncatellum Dalm. New Jersey, probably.

BOTHRIOTHORAX Ratz.

- B. noveboracensis* How. New York.
B. peculiaris How. On puparia of Syrphid flies (Ashm).

HOMALOTYLUS Mayr.

- H. terminalis* Say. Parasitic on Coccinellids.

APHYCUS Mayr.

- A. brunneus* How. Recorded from New Jersey.
A. pulchellus How. New Jersey, probably.

CHILONEURUS Westw.

C. albicornis How. New Jersey, probably.

ENCYRTUS Dalm.

E. bucculatricis How. Should occur in New Jersey.

E. turni Pack. New Jersey district.

METALLON Walk. = RHOPUS Forst.

R. coccois Smith. New Jersey, probably.

Family LXIX PTEROMALIDÆ.

Sub family I MERISINÆ.

MICROMELUS Walk.

M. subapterus Riley. In wheat fields (Ashm).

M. destructor Say. Also in wheat fields.

HOMOPORUS Thoms.

H. chalcidephagus Walsh. New Jersey, probably.

Sub-family II PTEROMALINÆ.

RAPHITELUS Walk.

R. maculatus Walk. New Brunswick, VIII, bred from *Pissodes strobi*, the white pine weevil (Sm).

EUTELUS Walk.

E. onerati Fitch. New York.

MERAPORUS Walker.

M. calandræ How. Should occur in New Jersey.

PTEROMALUS Swed.

P. gelechiæ Webst. New Jersey, probably.

P. fuscipes Prov. New York and probably New Jersey.

P. puparum Linn. Parasitic on cabbage butterfly, and common throughout the State.

P. vanessæ Harris. Parasite on *Vanessa antiopa*, throughout the State.

HYOPTEROMALUS Ashm.

H. tabacum Fitch. "New Jersey" (Ashm).

CATOLACCUS Thoms.

C. anthonomi Ashm. New Jersey, probably.

DIGLOCHIS Forst.

D. omnivora Walk. New Jersey district.

DIBRACHYS Först.

D. bruceanus Ratz. New Brunswick on *Clisiocampa americana* (Sm).

CÆLOPISTHUS Thoms.

C. smithii Ashm. Jamesburg (Sm).

Sub-family III **SPHEGIGASTERINÆ.****CAROTOMUS** Dalm.

C. megacephalus Dalm. New Jersey, probably.

METAPON Walk.

M. rufipes Ashm. New Jersey, probably.

PACHYNEURON Walk.

P. altiscuta How. New Jersey district.

P. micans How. New Jersey district.

Sub-family IV **SPALANGINÆ.****ISOCRATUS** Först.

I. vulgaris Walk. New Brunswick, VII, 20 (Sm).

SPALANGIA Latr.

S. drösophilæ Ashm. Parasite on the Pomace flies.

S. hæmatobiæ Ashm. Parasite upon the "horn fly."

S. rugosicollis Ashm. New Jersey, probably.

Family LXX ELASMIDÆ.**ELASMUS** Westw.

E. nigripes How. New Jersey district.

Family LXXI EULOPHIDÆ.**Sub-family I ENTEDONINÆ.****OMPHALE Haliday.**

O. livida Ashm. New Jersey district.

CLÖSTEROCERUS Westw.

C. tricinctus Ashm. New Jersey district.

HOLCOPELTE Först.

H. fraterna Fitch. New York.

H. euplectri How. Should occur in New Jersey.

ENTEDON Dalm.

E. albitarsis Ashm. New Jersey district.

ASECODES Först.

A. albitarsis Ashm. New Jersey probably.

Sub-family II APHELININÆ.**COCCOPHAGUS Westw.**

C. ater How. Parasite on soft scales.

C. lecanii Fitch. Parasite of soft scales.

APHELINUS Dalm.

Fig. 267.—*Aphelinus fuscipennis*: San Jose scale parasite.

A. mali Hald. Probably New Jersey.

A. mytilaspidis LeB. Parasite on *Mytilaspis pomorum* and common throughout the State.

A. fuscipennis How. Parasite on *Aspidiotus perniciosus*, and found wherever this scale has obtained a foothold.

ERETMOCERUS Hald.

E. corni Hald. Parasite on Aleyrodes.

Sub-family III TETRASTICHINÆ.

SYNTOMOSPHYRUM Först.

S. orgyiae Ashm. Parasite on *Orgyia leucostigma* (Ashm).

TRICHOPORUS Först.

T. columbianus Ashm. Lives in Cecidomyid galls, widely distributed (Ashm).

MELITTOBIA Westw.

T. chalybii Ashm. Parasite in nest of *Chalybion ceruleum*, Long Island (Ashm).

TETRASTICHUS Haliday.

T. racemariæ Ashm. New Brunswick; parasite in oak galls (Sm).

T. theclæ Pack. Should be in New Jersey.

T. sp. n. Clementon, VIII, 6 (Jn).

Sub-family IV EULOPHINÆ.

Tribe I Elachistini.

EUPLECTRUS Westw.

E. catocalæ How. Parasite upon Catocala larva.

E. comstockii How. Should occur in New Jersey.

E. plathypenæ How. Parasitic on *Plathypena scabra*.

E. frontalis How. Riverton, IV, 17 (Jn).

ELACHISTUS Spin.

E. proteoteratis How. New Jersey, probably.

MIOTROPIS Thoms.

M. clisiocampæ Ashm. New Brunswick, larva on *Clisiocampa americana* (Sm).

Tribe II Eulophini.

SYMPIESIS Först.

S. nigrifemora Ashm. New Jersey, probably.

CRATOTECHUS Thoms.

C. orgyiæ Fitch. "New Jersey."

Family LXXII TRICHOGRAMMIDÆ.

Sub-family II TRICHOGRAMMINÆ.

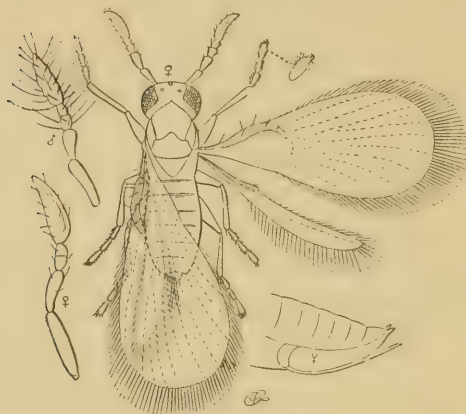


Fig. 268.—An insect egg parasite, *Trichogramma pretiosa*, very much enlarged.

TRICHOGRAMMA Westw.

T. odontotæ Howard. New Jersey, probably.

T. pretiosa Riley. Should occur in New Jersey.

Family LXXIII MYMARIDÆ.

Sub-family II MYMARINÆ.

POLYNEMA Haliday = COSMOCOMA Först.

P. howardii Ashm. Should occur in New Jersey.

P. œcanthi Ashm. "New Jersey" (Ashm).

Super-family VIII ICHNEUMONOIDEA.

Contains larger species on the whole, the wings with a well arranged series of veins, antennæ not elbowed, ovipositor attached before the end of the abdomen and sometimes very long. Parasitic on other insects.

Family LXXIV EVANIIDÆ.

In this family the abdomen is long, flattened transversely, attached by a narrow base to the top of the thorax.

Sub-family I AULACINÆ.**AULACUS Jur.**

- A. fasciatus* Say. New York (Ashm).
A. stigmaterus Cress. Recorded from New Jersey.
A. pallipes Cress. New York (Ashm).

Sub-family II EVANIINÆ.**GASTERUPTION Latr. = FÆNUS Fabr.**

- G. tarsatorium* Say. Delaware Water Gap, VII, 9 (Jn).
G. incertum Cress. New Jersey, probably.

EVANIA Fabr.

- E. appendigaster* Linn. A cosmopolitan species which I have found at Newark and New Brunswick: it breeds in the egg capsules of cockroaches.

HYPTIA Illig.

- H. reticulatum* Say. Caldwell (Cr).

Family LXXVI ICHNEUMONIDÆ.

The abdomen is inserted in the usual way at the end of the thorax, at the lower edge.

Sub-family I ICHNEUMONINÆ.**Tribe I Joppini.****PSILOMASTIX Tischb.**

- P. exesorius* Brullé. Caldwell (Cr), Newark, New Brunswick, Anglesea, IX (Sm), Staten Island (Ds), Westville (Fox): parasitic in pupæ of swallow-tail butterflies.

TROGUS Grav.

T. nubilipennis Hald. Orange Mts.,
1 specimen (Sm).

T. obsidianator Brullé. I have taken
this near Montclair (Sm).

T. elegans Cress. Delaware Water
Gap, VII, 15 (Jn).

AUTOMALUS Wesmæl.

A. brullei Cress. Newark, New
Brunswick, from larva of *Dolba*
hylæus and *Smer. astylus* (Sm),
Westville, VI, 7 (Jn).

A. copei Cress. New Jersey, probably.

A. canadensis Prov. Staten Island, IX, (Ds).



Fig. 269 — *Psilomastix exesorius* on chrysalis of
Papilio, from which it has emerged.

TROGOMORPHA Ashm.

T. trogiformis Cress. "New Jersey" (Cress Coll).

Tribe II Ichneumonini.

HOPLISMENUS Grav.

H. morulus Say. Staten Island (Ds), "New Jersey," III, 13 (Jn), "New
Jersey" (Cress Coll).

CHASMODES Wesmæl.

C. orpheus Cress. New Jersey, probably.

C. sauceus Cress. Long Island (Ashm).

EXEPHANES Wesmæl.

E. brevipennis Cress. Long Island (Ashm).

E. confirmatus Cress. Long Island (Ashm).

ICHNEUMON Linn.

I. acerbus Cress. New Jersey, probably.

I. agnitus Cress. New Jersey, probably.

I. annulatus Prov. Clementon, V, 22 (Jn).

I. annulipes Cress. Sea Isle City, VI, 21 (Jn).

I. apertus Cress. Should occur in New Jersey.

I. ater Cress. Should occur in New Jersey.

I. azotus Cress. Should occur in New Jersey.

- I. bimembris* Prov. Long Island (Ashm).
- I. brevicinctor* Say. New York (Ashm).
- I. blandii* Cress. Long Island (Ashm).
- I. bronteus* Cress. New York (Ashm).
- I. caliginosus* Cress. Long Island (Ashm).
- I. cœruleus* Cress. Newark, Lahaway, VIII, 6, New Brunswick (Sm).
- I. centrator* Say. Bred from *Pyrrh. isabella* (Sm), Staten Island, XI (Ds).
- I. cincticornis* Cress. Staten Island, IV (Ds), Long Island (Ashm).
- I. citrifrons* Cress. "New Jersey" (Sm).
- I. comes* Cress. Westville, VI, 6 (Jn).
- I. comptus* Say. Staten Island (Ds), Philadelphia, VI, 11 (Fox), Caldwell (Cr), Westville, VI, 6 (Jn).
- I. consignatus* Cress. New Jersey, probably.
- I. creperus* Cress. New Jersey, probably.
- I. devinctor* Say. Staten Island, II (Ds).
- I. duplicatus* Say. "New Jersey" (Sm).
- I. extrematatis* Cress. Staten Island, VI (Ds).
- I. feralis* Cress. Should occur in New Jersey.
- I. finitimus* Cress. Should occur in New Jersey.
- I. flavicornis* Cress. = male of *malacus*, Say (Ashm). "New Jersey" (Sm).
- I. flavizonatus* Cress. Should occur in New Jersey.
- I. funestus* Cress. Long Island (Ashm).
- I. fuscifrons* Cress. "United States" (Cress).
- I. galenus* Cress. "New Jersey" (U S N M, Cress Coll).
- I. germanus* Cress. Massachusetts to Virginia (Cress).
- I. grandis* Brullé. Pennsylvania (Ashm).
- I. helvipes* Cress. "United States" (Cress).
- I. insolens* Cress. "United States" (Cress).
- I. instabilis* Cress. "New Jersey" (Cress Coll).
- I. jejunus* Cress. Long Island (Ashm).
- I. jucundus* Brullé. Long Island (Ashm).
- I. lætus* Brullé. Newark, New Brunswick, Lahaway (Sm), Staten Island, VII (Ds).
- I. leucaniæ* Fitch. New York, parasitic on the army worm, and undoubtedly also occurs in New Jersey.
- I. leviculus* Cress. New York to Virginia (Cress).
- I. lewisii* Cress. "United States" (Cress).
- I. libens* Cress. "New Jersey" (Cress Coll).
- I. lividulus* Prov. Newark, from *Agrotis c-nigrum* (Sm), New Jersey (U S N M).
- I. longulus* Cress. "United States" (Cress).

- I. *maius* Cress. Massachusetts to North Carolina (Cress).
 I. *malacus* Say. Jamesburg, New Brunswick, IX, 2 (Sm), Philadelphia, VI, 11 (Fox).
 I. *maurus* Cress. Staten Island (Ds).
 I. *merus* Cress. Massachusetts, Virginia (Cress).
 I. *milvus* Cress. "United States" (Cress).
 I. *mimicus* Cress. "United States" (Cress).
 I. *mucronatus* Prov. Canada, Virginia (Cress).
 I. *nanus* Cress. New Brunswick, VII, from *Acrobasis rubrifasciella* (Sm).
 I. *navus* Say. Staten Island, IV and V (Ds).
 I. *nuncius* Cress. Staten Island, IV (Ds).
 I. *otiosus* Say. "New Jersey" (Cress Coll).
 I. *paratus* Say. Philadelphia, VI, 11 (Fox).
 I. *parvus* Cress. "United States" (Cress).
 I. *pepticus* Cress. Recorded from New Jersey.
 I. *pomilius* Prov. Canada, United States (Cress).
 I. *pulcher* Brullé. Canada, United States (Cress).
 I. *residuus* Say. "United States" (Say).
 I. *rubicundus* Cress. Canada, United States (Cress).
 I. *rufiventris* Brullé. "New Jersey" (Cress Coll).
 I. *scriptifrons* Cress. Long Island (Ashm).
 I. *scitulus* Cress. Canada, United States (Cress).
 I. *sagus* Cress. Long Island (Ashm).
 I. *seminiger* Cress. "New Jersey" (Cress Coll).
 I. *signatipes* Cress. Long Island (Ashm).
 I. *sorrow* Cress. Westville, VII, 4 (Jn).
 I. *suadus* Cress. Clementon, V, 30 (Jn).
 I. *subcyaneus* Cress. Caldwell (Cr).
 I. *subdolos* Cress. Staten Island (Ds), Long Island (Ashm).
 I. *succinctus* Brullé. Caldwell (Cr). I have taken or seen this almost everywhere in the State.
 I. *solitus* Cress. Long Island, Camden Co., III (Jn).
 I. *unifasciatus* Say. Parasite on *Acronycta oblinita*, Caldwell (Cr).
 I. *ultimus* Cress. Cramer Hill, V, 21 (Jn).
 I. *utilis* Cress. "United States" (Cress).
 I. *vittifrons* Cress. Long Island (Ashm).
 I. *variegatus* Cress. United States (Cress).
 I. *vitulis* Cress. Long Island (Ashm).
 I. *velox* Cress. "New Jersey" (Cress).
 I. *versabilis* Cress. Canada, United States (Cress).
 I. *vescus* Prov. Canada, United States (Cress).

- I. vinnulus* Cress. Jamesburg (Sm).
I. viola Cress. Long Island (Ashm).
I. volens Cress. Canada, United States (Cress).
I. w-album Cress. Staten Island, VI (Ds), Philadelphia, VI, 11 (Fox).
I. wilsoni Cress. "United States" (Cress).
I. zebratus Cress. "United States" (Cress).

AMBLYTELES Wesmæl.

- A. anceps* Cress. Connecticut, Delaware (Cress).
A. detritus Brullé. "New Jersey" (Cress Coll).
A. excultus Cress. "New Jersey" (Cress Coll).
A. fraternus Cress. Massachusetts, Virginia (Cress).
A. improvisus Cress. "New Jersey" (Cress).
A. jejunos Cress. Long Island (Ashm).
A. indistinctus Prov. Canada, United States (Cress).
A. innotabilis Cress. New York (Ashm).
A. luctus Cress. Newark, bred from a Noctuid larva (Sm).
A. lewisi Cress. Long Island (Ashm).
A. nubivagus Cress. Flatbush, Long Island (Zabriskie).
A. ormenus Cress. Canada, United States (Cress).
A. rufizonatus Cress. Recorded from New Jersey and in (Cress Coll).
A. sublatatus Cress. Staten Island, VIII (Ds), Clementon, V, 30 (Jn).
A. semicæruleus Cress. Canada, United States (Cress).
A. subfuscus Cress. Staten Island, X (Ds), New York (Zabriskie).
A. suturalis Say. Caldwell (Cr), "New Jersey" (Cress Coll).
A. ultus Cress. Canada, United States (Cress).
A. succinctus Brullé. Long Island (Ashm).

PROBOLUS Wesmæl.

- P. rufozonatus* Cress. New York (Ashm).
P. tetricus Bv. New York (Ashm).

EURYLABUS Wesmæl.

- E. agilis* Cress. Should occur in New Jersey.

PLATYLABUS Wesmæl.

- P. thoracicus* Cress. Canada, United States (Cress).
P. foxi Davis. Camden Co. (Davis).

Tribe IV Heresiarchini.

PLAGIOTRYPES Ashm.

- P. concinnus* Say. New Jersey, probably.

Tribe VI Phæogenini.

COLPOGNATHUS Wesmæl.

C. helvus Cress. Long Island (Ashm).

CENTETERUS Wesmæl.

C. tuberculifrons Prov. Long Island (Ashm).

PHÆOGENES Wesmæl.

P. fungor Norton. Long Island, Philadelphia (Ashm).

P. hebe Cress. Long Island (Ashm).

P. helvolus Cress. "United States" (Cress).

HERPESTOMUS Wesmæl.

H. hebrus Cress. New York (Ashm).

Sub-family II CRYPTINÆ.

Tribe I Stilpnini.

SELEUCUS Holm.

S. rufiventris Ashm. New York (Ashm).

ASYNCRITA Först.

A. compressa Cress. New York (Ashm).

STILPNUS Grav.

S. americanus Cress. Staten Island, IX (Ds).

Tribe II Phygadeuonini.

PLESIOGNATHUS Först.

P. flavescens Cress. Philadelphia, "New Jersey" (Jn).

PHYGADEUON Grav.

P. vulgaris Cress. Long Island (Ashm).

P. mucronatus Prov. New York (Ashm).

P. subfuscus Cress. Long Island (Ashm).

P. planosæ Fitch. New York (Fitch).

Tribe III Hemitelini.

SYNECHES Först.

S. thyridopterygis Riley.

Parasite on *Thyridopteryx ephemeraeformis*, the common bag worm, throughout the State.



ACROLYTA Först.

A. smerinthus Ashm. Bred from *Smerinthus geminatus* (Sm).

Fig. 270.—Bag-worm parasite, *Syneches thyridopterygis*; *a*, male; *b*, female; *c*, cut through bag to show the cocoons of the parasite; all enlarged.

ACNOPLIX Först.

A. betulæcola Ashm. Jamesburg (Sm).*A. ruficornis* Ashm. Long Island (Ashm).

BATHYTHRIX Först.

B. meteori How. New York (Ashm).

ISODROMAS Först.

I. aletiae Ashm. Parasitic on *Apanteles*, New York (Ashm).

HEMITELES Grav.

H. tenellus Say. Long Island (Ashm).*H. utilis* Norton. Jamesburg, parasite on *Anisota senatoria* (Sm).

Tribe IV Pezomachini.

APTESIS Först.

A. micropterus Say. Pennsylvania (Cress).

PEZOMACHUS Grav.

P. dimidiatus Cress. New York (Ashm).*P. gentilis* Cress. Pennsylvania (Cress).*P. gracilis* Cress. Pennsylvania (Cress).*P. macer* Cress. Pennsylvania (Cress).*P. meabilis* Cress. Staten Island (Ds).*P. obscurus* Cress. Recorded from New Jersey.*P. unicolor* Cress. Massachusetts, Delaware (Cress).*P. tantillus* Cress. Riverton, V, 17 (Jn).

Tribe V Cryptini.

MEGAPLECTES Först.

M. blakei Cress. New York (Ashm).

OSPRYNOCROTUS Spin.

O. junceus Cress. Long Island (Ashm).

TRYCHOSIS Först.

T. montivagus Prov. Delaware (Ashm).

IDIOLISPA Först.

I. leniatus Cress. Long Island (Ashm), Clementon, V, 16 (Jn).

I. similis Cress. Long Island (Ashm), New York (U S N M).

GAMBRUS Först.

G. atriceps Cress. Long Island (Ashm).

SPILOCRYPTUS Thoms.

S. extrematis Cress. Jamesburg (Sm).

S. incertus Cress. Long Island (Ashm).

S. nuncius Say. Jamesburg, parasite on *Botis feudalus* (Sm).

CRYPTUS Fabr.

C. alacris Cress. Canada, Delaware (Cress).

C. americanus Cress. New Brunswick (Sm), Clementon, VIII, 11 (Jn).

C. contiguus Cress. Canada, Maryland (Cress).

C. punicus Cress. Glassboro, IX, 19 (Jn).

C. subclavatus Say. "United States" (Cress).

C. retentus Brullé. Staten Island IX (Ds), Philadelphia (Ashm).

ITAMOPLEX Först.

I. nigricornis Prov. Long Island (Ashm).

I. americanus Cress. "New Jersey," Long Island (Ashm).

I. persimilis Cress. Avalon, VI, 30, Sea Isle City, VII, 22 (Jn).

Tribe VI Mesostenini.

MESOSTENUS Grav.

M. albomaculatus Cress. Ocean Grove, VIII (Ashm), Westville, VI, 6 (Jn).

M. arvalis Cress. Parasite in nest of *Polistes*.

- M. americanus* Cress. Maine, Virginia (Cress).
M. gracilis Cress. Sea Isle City, VII, 22 (Jn).
M. thoracicus Cress. Atco, VI, 4 (Jn).
M. albopictus Cress. Atco, VI, 18, Westville, VII, 21, Riverton, VIII, 4 (Jn).

Sub-family III PIMPLINÆ.

Tribe I Acanitini.

COLEOCENTRUS Grav.

- C. rufus* Prov. Pennsylvania (Ashm).

AROTES Grav.

- A. amœnus* Cress. Canada, United States (Cress).
A. decorus Say. Bronx Park, New York, VI (Ds).
A. venustus Cress. Delaware Water Gap, VII, 12 (Jn).
A. vicinus Cress. Delaware Water Gap, VII, 12 (Jn).

Tribe II Labenini.

LABENA Cress.

- L. grallator* Say. Long Island, "New Jersey" (Ashm).
L. apicalis Cress. New Brunswick (Sm).

GROTEA Cress.

- G. anguina* Cress. Ocean Grove, VII (Ashm), Woodbury, VI, 27 (Jn).

Tribe III Lissonotini.

ASPHRAGIS Först.

- A. mirabilis* Cress. New Jersey, probably.

LISSONOTA Grav.

- L. rubrica* Cress. "New Jersey" (Cress).
L. elegans Cress. New Jersey, probably.

LAMPRONOTA Haliday = CYLLOCERIA Schiödte.

- L. occidentalis* Cress. New York (Ashm).

BATHYCETES Först.

- B. scutellaris* Cress. Delaware Water Gap, VII, 8 (Jn).
B. parva Cress. New Jersey, probably.

ALLOPLASTA Först.

- A. americana* Cress. "United States" (Cress).
A. insita Cress. "New Jersey" (Cress).
A. occidentalis Cress. Should be found in New Jersey.
A. pleuralis Cress. "United States" (Cress).
A. pulchella Cress. "New Jersey" (Cress).
A. tegularis Cress. New Jersey, probably.
A. varia Cress. This form is sure to occur with us.

ARENETRA Holmgr.

- A. nigrita* Walsh. Canada, United States (Cress).
A. ventralis Cress. New York, Pennsylvania (Cress).

PHYTODIETUS Grav.

- P. distinctus* Cress. Canada, United States (Cress).
P. vulgaris Cress. Long Island (Ashm), Ocean County, V (Sm).

MENISCUS Schiödte.

- M. agilis* Cress. New York, Pennsylvania (Cress).
M. elegans Cress. Canada, United States (Cress).

Tribe IV Pimplini.

RHYSSA Grav.

- R. albomaculata* Cress. "New Jersey" (Cress Coll).
R. persuasoria Linn. New York (Ashm).

THALESSA Holmgr.

- T. atrata* Fabr. Staten Island (Ds), Caldwell (Cr). Common throughout the State (Sm).
T. lunator Fabr. Staten Island (Ds), less common, but equally wide-spread (Sm). These species are the common long-tailed Ichneumons often found with their bristle-like ovipositor which is four inches or more in length, inserted into trees: hence often suspected of being wood borers.
T. nitida Cress. Has been taken on the Palisades near Fort Lee.
T. nortonii Cress. Rare at Caldwell (Cr).

EPHIALTES Grav.

- E. albipes* Cress. Recorded from New Jersey.
E. comstockii Cress. New York (U S N M).
E. irritator Fabr. Clementon, V, 10 (Jn).
E. rex Kriech. New York (Ashm).
E. tuberculatus Fourc. Canada, United States (Cress).

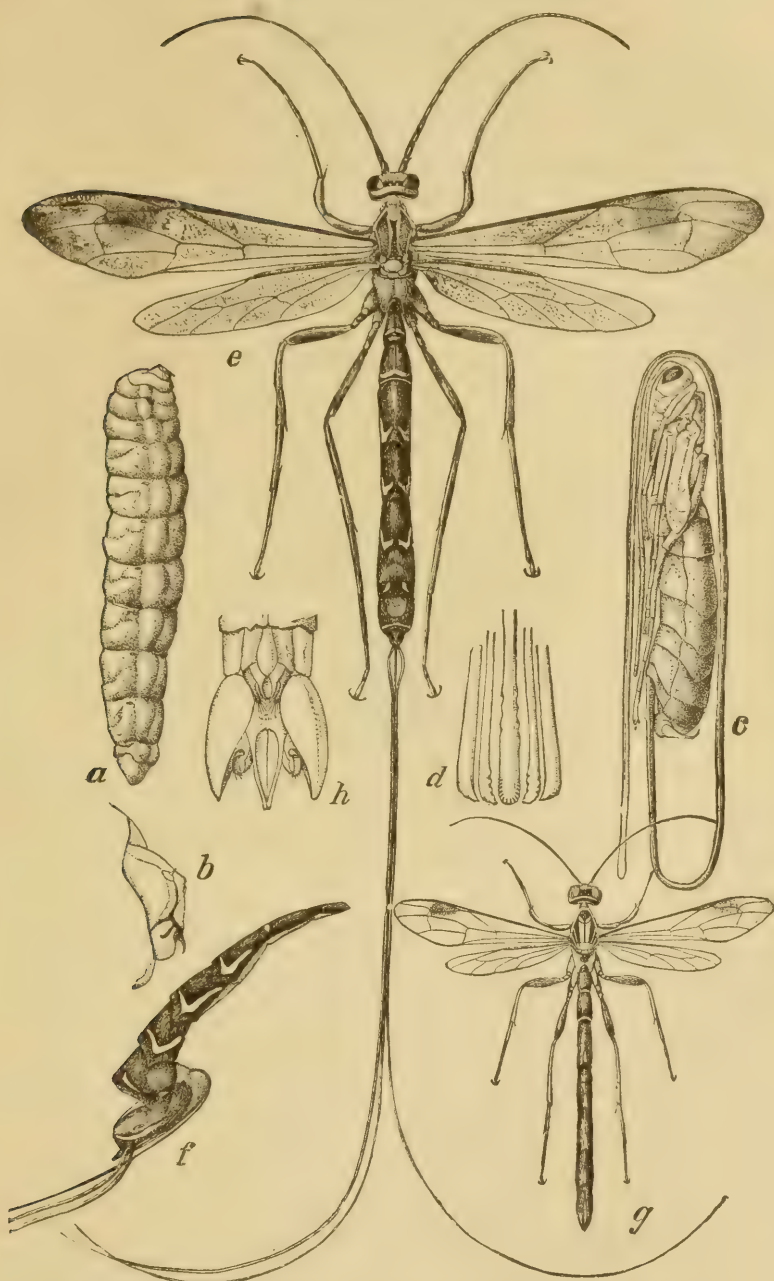


Fig. 271.—Long-tailed ichneumon, *Thalessa lunator*: *a*, larva; *b*, head of same enlarged; *c*, pupa; *d*, tip of pupal ovipositor enlarged; *e*, female adult; *f*, tip of her abdomen from side; *g*, male adult; *h*, tip of abdomen enlarged.

PERITHOUS Holmgr.

P. pleuralis Cress. Nyack, N. Y. (Zabriskie).

THERONIA Holmgr.

T. melanocephala Brullé. "New Jersey" (Ashm).

T. fulvescens Cress. Long Island (Ashm), Little Falls, V (Ds).

PIMPLA Fabr.

P. alboricta Cress. Canada, Delaware (Cress).

P. annulicornis Cress. Canada, Illinois (Cress).

P. annulipes Brullé. Anglesea, V, 28, Glassboro, VII, 2 (Greene), Staten Island, VI (Ds), Caldwell (Cr).

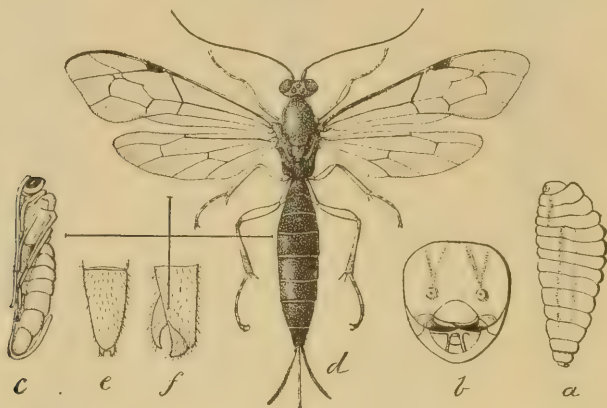


Fig. 272.—*Pimpla conquisitor*; a, larva; c, pupa; d, adult female; all enlarged: other letters refer to structural details.

P. conquisitor Say. New Brunswick, bred from *Clisiocampa*, *Acrobasis* and divers others (Sm), Westville (Fox), Staten Island (Ds), Riverton, V, 1 (Jn).

P. indagatrix Walsh. Canada, United States (Cress).

P. inquisitor Say. Staten Island (Ds), New Brunswick, &c.: bred from *Orgyia*, *Acrobasis*, *Teras*, &c. (Sm).

P. notanda Cress. Riverton, V, 1 (Jn), "New Jersey" (Cress Coll).

P. pedalis Cress. Caldwell (Cr), New Brunswick (Sm), Staten, IX (Ds).

P. picticornis Cress. Recorded from the State.

P. rufopectus Cress. Canada, Pennsylvania (Cress).

P. rufovariata Cress. "New Jersey" (Cress).

P. scriptifrons Cress. "United States" (Cress).

P. tenuicornis Cress. Anglesea, V, 28, parasite on *Sesia caudata* (Sm), "New Jersey" (Cress).

P. pterelas Say. "New Jersey" (Cress Coll).

POLYSPHINCTA Grav.

- P. limata* Cress. Recorded from New Jersey.
P. nigrita Walsh. Staten Island, III (Ds).

CTENOCHIRA Först.

- C. scitula* Cress. "New Jersey" (Cress).
C. leucozonata Ashm. Philadelphia, VII, 5 (Jn).

GLYPTA Grav.

- G. animosa* Cress. New York (Cress).
G. erratica Cress. "United States" (Cress).
G. militaris Cress. Pennsylvania (Jn).
G. rufiscutellaris Cress. New Brunswick, VII, 20 (Sm).
G. simplicipes Cress. Middlesex Co., VI and VII (Sm).
G. vulgaris Cress. "New Jersey" (Cress Coll).
G. varipes Cress. Riverton, IV, 17 (Jn).

PANTELES Först.

- P. mellithorax* Ashm. Clementon, VI, 30 (Jn).

Tribe V Xoridini.

ODONTOMERUS Grav.

- O. bicolor* Cress. Westville, VI, 6 (Jn).
O. mellipes Say. Staten Island (Ds), "New Jersey" (Cress Coll).

CALLICLISIS Först. = EUXORIDES Cress.

- C. americanus* Cress. "United States" (Cress).

XYLONOMUS Grav.

- X. albopictus* Cress. Pennsylvania (Ashm).
X. stigmatopterus Say. "New Jersey" (U S N M).

XORIDES Grav.

- X. vittifrons* Cress. "New York" (U S N M).

Sub-family IV TRYPHONINÆ.

Tribe I Mesoleptini.

SPANOTECNUS Först.

- S. discolor* Cress. "Delaware" (Davis).
S. concolor Cress. "New Jersey" (Davis).

ECLYTUS Holm.

E. perennis Davis. New York (Davis).

E. pleuralis Prov. New York (Ashm).

LAPHYROSCOPUS Först.

L. capitatus Cress. Pennsylvania (Davis).

POLYCINETUS Först.

P. limatus Cress. Delaware, New York (Davis).

HOMASPIS Först.

H. albipes Davis. New York (Davis).

NOTOPYGUS Holm.

N. cultus Cress. "New Jersey" (Davis).

CATOGLYPTUS Först.

C. furcatus Cress. "United States" (Cress).

MESOLEPTUS Grav.

M. decens Cress. New York (Ashm)

M. zebratus Davis. New York (Davis).

M. inceptus Cress. Clementon, VIII, 11 (Jn).

HADRODACTYLUS Först.

H. inceptus Cress. "United States" (Cress).

H. elongatus Cress. Delaware (Davis).

ALEXETER Först.

A. honestus Cress. "New Jersey" (Davis).

A. canaliculatus Prov. Philadelphia (Jn).

OXYTORUS Först.

O. antennatus Cress. Delaware (Davis).

SYMPHOBUS Först.

S. pleuralis Cress. "New Jersey" (Davis).

ZEMIODES Först.

Z. flavifrons Cress. "New Jersey" (Davis).

Tribe II Cteniscini.

CTENISCUS Hal.

- C. flavicoxæ* Cress. Canada, Delaware (Cress).
C. orbitalis Cress. Canada, Pennsylvania (Cress).

ANECPHYSIS Först.

- A. curvineura* Davis. New York (Davis).

EXYSTON Holm.

- E. clavatus* Cress. "New Jersey" (Ashm).
E. variatus Prov. "New Jersey" (Ashm).

Tribe III Ctenopelmini.

RHORUS Först.

- R. bicolor* Cress. Pennsylvania, New York (Davis).

CTENOPELMA Holm.

- C. sanguinea* Prov. "New Jersey" (Davis).
C. terminalis Ashm. Atco, VI, 13 (Jn).

SYMPHERTA Först.

- S. unicolor* Cress. Pennsylvania, Delaware (Davis).

ECZETESIS Först.

- E. paniscoides* Ashm. New York (Ashm), Pennsylvania (Jn).

EUMESIUS Westw. = EACEROS Grav.

- E. canadensis* Cress. New York (Ds).
E. medialis Cress. New York (Davis), Philadelphia (Jn).
E. flavescens Cress. Pennsylvania (Ashm).

SCORPIORUS Först.

- S. subcrassus* Cress. Pennsylvania (Davis).
S. analis Cress. Pennsylvania (Davis).

ERROMENUS Holm.

- E. crassus* Cress. Recorded from New Jersey.
E. dimidiatus Cress. Recorded from New Jersey.

MONOBLASTUS Hartig.

M. varifrons Cress. Westville, VI, 6 (Jn).

POLYBLASTUS Hartig.

P. pedalis Cress. New York (Ashm).

P. tibialis Cress. New York (Ashm).

SCOLOBATES Grav.

S. crassitarsus Grav. New York (Ashm).

Tribe IV Tryphonini.

OLOPHORUS Först.

O. innumerabilis Davis, var. *feria* Davis. New York (Davis).

BARYCEROS Prov.

B. rhopalocerus Prov. New York (Davis).

SYNÆCETES Först.

S. sedulus Cress. "New Jersey" (Davis).

S. propinquus Cress. Clementon, V, 10 (Jn).

COSMOCONUS Först.

C. canadensis Prov. New York (Ashm).

QUADRIGANA Davis.

Q. americana Cress. "New Jersey" (Davis).

TRYPHON Grav.

T. communis Cress. "New Jersey" (Davis).

T. festivus Cress. Clementon, V, 10 (Jn).

T. clypeatus Cress. "New Jersey" (Davis).

T. seminiger Cress. Lenola, VI, 4, Clementon, V, 22 (Jn).

DIALGES Först.

D. frontalis Davis. New Jersey, probably.

D. rivalis Davis. Philadelphia (Jn).

CACOTROPA Först.

C. burrus Cress. New York (Zabriskie).

BÆTHUS Först.

B. schizoceri How. Parasite on sweet potato saw-fly (Ashm).

MESOLEIUS Holm.

M. submarginatus Cress. New York (Davis).

M. mellipes Prov. New York (Davis).

Tribe V Bassini.

BASSUS Grav.

B. lætatorius Fabr. "New Jersey," common (Ashm), Riverton, V, 7 (Jn.).

B. orbitalis Cress. New York (Davis).

PROMETHUS Först.

P. costalis Prov. New York (Ashm).

SYRPHOCTONUS Först.

B. agilis Cress. "New Jersey" (Davis).

Tribe VI Exochini.

ALCOCERAS Först.

A. trifasciatus Cress. "United States" (Cress).

CHORINÆUS Holm.

C. carinatus Cress. New Jersey, probably.

TRICHISTUS Först.

T. curvator Fabr. New Brunswick (Sm).

METACÆLUS Först.

M. lævis Cress. New Brunswick, VIII, 17 (Sm).

EXOCHUS Grav.

E. dorsalis Cress. "New Jersey" (Cress).

Tribe X Metopiini.

METOPIUS Grav.

M. pollinatorius Say. "United States" (Cress).

Sub-family V OPHIONINÆ.

These species are large, often honey-yellow or black in color, and have a transversely flattened abdomen smallest at the tip: the ovipositor is short and is often used as a sting.

Tribe II Ophionini.

OPHION Fabr.

- O. bifeveolatum* Brullé. "United States" (Cress).
O. bilineatum Say. Staten Island (Ds), Riverton, V, 1 (Jn).
O. glabratum Say. "United States" (Cress).
O. macrurum Linn. Newark, New Brunswick, everywhere, parasitic on the larger silk worms (Sm).
O. tityri Pack. New Brunswick (Sm).

Fig. 273—*Ophion macrurum*.

THYREODON Brullé.

- T. morio* Fabr. Jamesburg, VIII, 11, Ocean Grove, VI, 1 (Sm).

EREMOTYLUS Först.

- E. arctiæ* Ashm. Long Island, Pennsylvania (Ashm).

Fig. 274.—*Enicospilus purgatum*.

ENICOSPILUS Steph.

- E. purgatum* Say. Anglesea, V, 30, Lahaway, VIII, 3 (Sm), Staten Island (Ds).

Tribe III Nototrachini.

NOTOTRACHYS Marsh.

- N. ejuncidus* Say. New York (Ashm).

Tribe IV Anomalini.

AGRYPON Först.

- A. pædiscaæ* Ashm. Parasite on Tortricids, *Pædisca* sp.

EIPHOSOMA Cress.

- E. femorata* Cress. Shark River, VI, 9 (Jn).

ANOMALON Grav.

- A. anale* Say. Newark, New Brunswick, V (Sm), Atco, VI, 18, Westville, VII, 4 (Jn).
A. curtum Nort. Westville, IV, 19 (Jn).
A. laterale Brullé. "United States" (Cress).
A. metallicum Nort. Delaware Water Gap, VII, 11 (Jn).
A. relictum Fabr. "United States" (Cress).
A. semirufum Norton. Westville, IV, 19 (Jn).
A. smithii Davis. New Brunswick (Sm).

EXOCHILUM Wesm.

- E. acronyctæ* Ashm. Delaware Water Gap, VII, 15 (Jn).
E. fuscipenne Nort. "New Jersey" (Sm).
E. mundum Say. Newark ex larva *Zerene catenaria* (Sm), Staten Island (Ds).
E. nigrovarium Prov. Westville, VI, 22 (Jn).

HETEROPELMA Wesm.

- H. flavicornis* Brullé. Jamesburg, IX, 4, Newark, ex larva *Sphinx luscitiosa* (Sm), Staten Island (Ds).
H. datanæ Riley. Parasitic on *Dalana* species.

Tribe V Campoplegini.

CAMPOPLEX Grav.

- C. diversus* Nort. Staten Island (Ds).

RHYTHMONOTUS Först.

- R. bilineatus* Ashm. Clementon, V, 16 (Jn).

ERIPTERMUS Först.

- E. primus* Ashm. Long Island (Ashm).

RHIMPHOCTONA Först.

- R. argentifrons* Cress. New York (Ashm).
R. compressa Cress. "United States" (Cress).

SINOPHORUS Först.

- S. johnsoni* Ashm. Atlantic City (Jn).

SPUDASTICA Först.

- S. rufipes* Ashm. Riverton, V, 1 (Jn).

MELOBORIS Holm.

- M. dubitata* Cress. Cramer Hill, V, 21 (Jn).
M. notæ Ashm. Long Island (Ashm).
M. subrubida Cress. "New Jersey," Long Island (Ashm).
M. obscura Cress. New York (Ashm).

LIMNERIA Holm.

- L. annulipes* Cress. Riverton, V, 13 (Jn).
L. distincta Cress. "New Jersey" (Cress).
L. flaviricta Cress. Lenola, V, 30, Sea Isle City, VII, 22 (Jn).
L. major Cress. Pennsylvania, Delaware (Cress).
L. obscura Cress. Pennsylvania, Texas (Cress).
L. oxylus Cress. Pennsylvania, Delaware (Cress).
L. tibiator Cress. "New Jersey" (Cress).
L. valida Cress. "United States" (Cress).
L. vicina Cress. Recorded from New Jersey.

AMELOCTONUS Först.

- A. fugitivus* Say. "United States" (Cress).
A. annulipes Cress. New Jersey, probably.

Tribe VI Paniscini.

OPHELTES Holm.

- O. glaucopterus* Linn. Long Island (Ashm).

PANISCUS Grav.

- P. geminatus* Say. Staten Island, V (Ds), Westville, IX, 12 (Jn), Caldwell (Cr).
P. albotarsatus Prov. New York (Ashm).
P. texanus Ashm. Westville, VI, 7 (Jn).

Tribe VII Banchini.

EXETASTES Grav.

- E. fascipennis* Nort. Staten Island (Ds), Riverton, X, 21 (Jn).
E. scutellaris Cress. Delaware Co., Pennsylvania (Jn).
E. suaveolens Walsh. Long Island (Ashm).

XENOCHESES Först.

- X. rufus* Prov. New York (Ashm).

CIDAPHURUS Först.

C. pallescens Prov. New York (Ashm).

BANCHUS Fabr.

B. inermis Prov. New York (Ashm).

CERATOSOMA Cress.

C. fasciata Cress. Staten Island, VIII (Ds).

Tribe VIII MESOCHORINI.

PLESIOPHTHALMUS Först.

P. paniscoides Ashm. New York, Massachusetts (Ashm).

ASTIPHROMMA Först.

A. uniformis Cress. Philadelphia (Ashm).

MESOCHORUS Grav.

M. americanus Cress. "United States" (Cress).

M. luteipes Cress. New Brunswick (Sm).

M. melleus Cress. Pennsylvania (Cress).

M. obliquus Cress. Pennsylvania (Cress).

M. scitulus Cress. New Brunswick, Ocean Co., V, ex larva *Smerinthus geminatus* (Sm).

Tribe IX Porizonini.

PRÆDRUS Först. = ORTHOPELMA Tasch.

P. diastrophii Ashm. Lives in Cynipid galls in blackberry, Jamesburg (Sm).

PORIZON Grav.

P. provancheri Ashm. = *P. pallipes* Prov. Long Island (Ashm).

LEPTOPYGAS Först.

L. orbus Davis. New Jersey district.

GONOLOCHUS Först.

G. rugosum Prov. New York (Ashm).

TEMELUCHA Först.

- T. retiniæ* Cress. Anglesea, V, 28 (Sm), Clementon, Sea Isle City, VII, 22 (Jn), Staten Island (Ds).
T. fascialis Cress. United States, widely distributed (Ashm).
T. cookii Weed. Atlantic Co., VII, parasite on blackberry leaf-roller (Sm).
T. websteri Ashm. Riverton, IX, 5 (Jn).
T. macer Cress. Clementon, V, 30 (Jn).

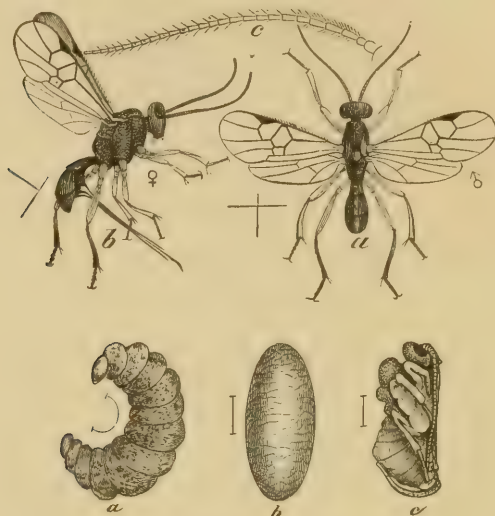
THERSILOCHUS Holm.

Fig. 275.—Parasite on plum curculio, *Thersilochus conotracheli*: male and female adults, larva (a), cocoon (b), and pupa (c); all much enlarged.

- T. conotracheli* Riley. Long Island (Ashm), "New Jersey" (Sm).

Tribe X Pristomerini.**PRISTOMERUS Holm.**

- P. aciculatus* Ashm. New York (Ashm).
P. euryptychiæ Ashm. Delaware Water Gap, VII, 6 (Jn).

Tribe XI Cremastini.**CREMASTUS Grav.**

- C. fumipennis* Ashm. Pennsylvania (Ashm).

Tribe XII Plectiscini.

ADELOGNATHUS Holm.

A. flavopictus Davis. New Jersey, probably.

PLECTISCUS Grav.

P. pleuralis Prov. Canada, United States (Cress).

EUSTERINX Först.

E. neglegere Davis. "New Jersey" (Davis).

ATELEUTE Först.

A. elongatus Davis. Atlantic City (Sm).

CAMPOTHREPTUS Först.

C. nasutus Cress. New York (Ashm).

Family LXXVII ALYSIIDÆ.

Sub-family II ALYSIINÆ.

CRATOSPILA Först.

C. rubicunda Say. Common throughout the United States (Ashm), Woodbury, VI, 27, Westville, VII, 22 (Jn).

ANARCHA Först.

A. laticincta Ashm. New Jersey, probably.

PANEREMA Först.

P. thoracica Ashm. New York (Ashm).

APHÆRETA Först.

A. muscæ Ashm. New Brunswick, VII, 20 (Sm).

A. auripes Prov. New Jersey, probably.

A. pallipes Say. New Brunswick (Sm).

GRAMMOSPILA Först.

G. triticaphis Fitch. New Jersey (Sm).

Sub-family III DACNUSINÆ.

CÆLINIUS Nees.

C. meromyzæ Forbes. Should occur in New Jersey.

TANYSTROPHA Först.

T. americana Ashm. Ocean Grove, V (Sm).

DACNUSA Hal.

D. smithii Ashm. Ocean Grove, V (Sm).

Family LXXVIII BRACONIDÆ.

Sub-family I APHIDIINÆ.

Most of the species of this sub-family are small and live parasitically in plant lice : as a rule where a plant louse is known to occur its parasite occurs with it, if it is a native species, and this suggestion has served as a basis to some extent in this part of the list.

EPHEDRUS Hal.

E. incompletus Prov. Probably New Jersey.

PRAON Hal.

P. humulaphidis Ashm. Parasite on hop plant louse.

P. cerasaphis Fitch. Parasite on cherry plant louse.

APHIDIUS Nees.

A. phorodontis Ashm. New Jersey, probably.

A. ribis Ashm. On currant louse.

A. nigriceps Ashm. New Jersey, probably.

A. obscuripes Ashm. New Jersey, probably.

A. bicolor Ashm. Riverton, V, 13 (Jn).

A. avenaphis Fitch. South Jersey on wheat louse (Sm), Atco, VI, 13 (Jn).

A. polygonaphis Fitch. New York (Cress).



Fig. 276.—Parasite on wheat louse; *Aphidius avenaphis*.

LYSIPHLEBUS Först.

L. ribaphidis Ashm. Parasite on currant louse.

L. myzi Ashm. New Jersey, probably.

TRIOXYS Hal.

T. ovalis Prov. Canada, and probably New Jersey.

LIPOLEXIS Först.

L. rapæ Curtis. Probably New Jersey.

ADIALYTUS Först.

A. populaphis Fitch. New Jersey, probably.

A. salicaphis Fitch. New Jersey, probably.

A. viburnaphis Fitch. New Jersey, probably.

Sub-family III EUPHORINÆ.

MICROCTONUS Wesm.

M. americanus Ashm. Jamesburg (Sm).

DINOCAMPTUS Först.

D. sculptus Cress. New Jersey, probably.

LOXOCEPHALUS Först.

L. boöps Wesm. Long Island (Ashm).

PERSISTENUS Först.

P. mellipes Cress. "New Jersey" (Cress).

Sub-family IV METEORINÆ.

ZEMIOTES Först.

Z. pallitarsis Cress. Cramer Hill, V, 21 (Jn).

METEORUS Hal.

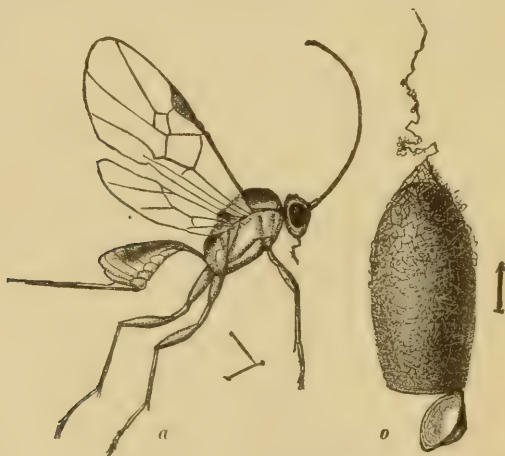


Fig. 277.—*Meteorus hyphantriae*, parasite on fall web-worm, and its cocoon: enlarged.

M. communis Cress. Jamesburg, VII, 4, Del. Water Gap, VII, 1 (Jn).

M. dimidiatus Cress. "United States" (Cress.)

M. vulgaris Cress. "New Jersey" (Cress Coll).

M. indagator Riley. Middlesex Co., VII, 20 (Sm).

SAPOTRICHUS Holm.

S. johnsoni Ashm. Philadelphia (Jn),

Sub-family V MACROCENTRINÆ.

MACROCENTRUS Curt.

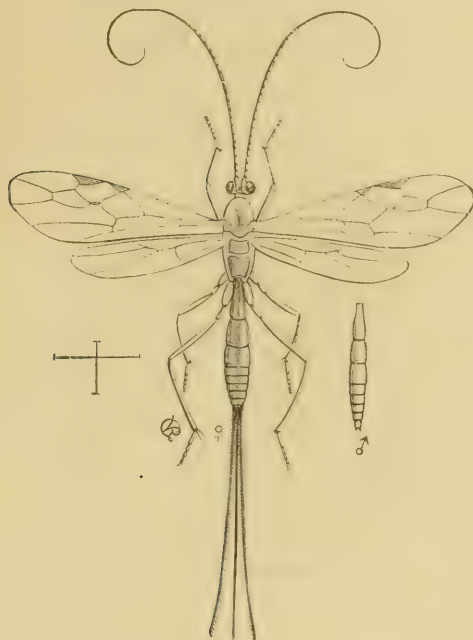


Fig. 278.—Codling moth parasite: *Macrocentrus delicatus*; enlarged.

M. delicatus Cress. Avalon, VII, 22 (Jn), common on many of the smaller Tortricid larvæ (Sm).

M. solidaginis Ashm. Long Island (Ashm), larva in Solidago Gall, also from *Cacæcia fervidana*.

M. nuperus Cress. New York (Ashm).

ZELE Haliday.

Z. uniformis Prov. New York (Ashm).

Z. truncatus Say. New York (Ashm).

AMICOPLUS Forst.

A. crambi Ashm. Parasite on *Crambus zeellus*, Philadelphia, V, 1 (Jn).

Sub-family VI HELCONINÆ.

HELCON Nees.

H. ligator Say. Camden, VI, 17 (Jn).

GYMNOSCELUS Först.

G. pedalis Cress. New York (Ashm).

EUMACROCENTRUS Ashm.

E. americanus Cress. Canada, Virginia (Cress).

CENOCELIUS Hal.

C. populator Say. Widely distributed, common (Ashm).

C. rubriceps Ratz. Camden, VI, 22 (Jn).

Sub-family VII BLACINÆ.

Tribe I Calyptini.

LEIOPHRON Nees.

L. phymatodis Ashm. Bred from larva *Phymatodes amœnus*, New Brunswick (Sm).

L. magdalis Cress. New Jersey, probably.

L. major Cress. New York (Ashm).

EUBADIZON Nees.

E. americanus Cress. "New Jersey," New York (Ashm).

Tribe II Orgilini.

ORGILOMORPHA Ashm.

O. gelechiæ Ashm. New Jersey, probably.

O. lithocolletidis Ashm. Bred from *Lithocolletis hamadrya* (Ashm).

ORGILUS Haliday.

O. mellipes Say. Atco, VI, 13 (Jn).

O. apicalis Ashm. New York.

Tribe II Blacini.

PYGOSTOLUS Hal.

P. lactucaphis Fitch. Parasite on lettuce plant louse.

BLACUS Nees.

B. rufipes Ashm. New York (Ashm).

GANYCHORUS Hal.

G. americanus Ashm. New Jersey, probably.

Sub-family VIII SIGALPHINÆ.

SIGALPHUS Latr.

S. curculionis Fitch. Parasite on the Plum Curculio.

S. tibiator Cress. New Jersey, probably.

S. rufiscapus Prov. Shark River, VII, 12 (Jn).

SCHIZOPRYNINUS Först.

S. bicolor Ashm. New York, Long Island (Ashm).

S. texanus Cress. Widely spread in the United States (Ashm).

UROSIGALPHUS Ashm.

U. robustus Ashm. Long Island (Ashm).

U. armatus Ashm. Pennsylvania (Ashm).

Sub-family IX CHELONINÆ.

CHELONUS Jur.

C. biannularis Ashm. Cape May, VI, 22 (Jn).

C. basilaris Say. Pennsylvania (Ashm).

C. electus Cress. Atlantic City, VII (Jn).

C. lunatus Hald. New Jersey, probably.

C. baricinctus Prov. Clementon, V, 30 (Jn).

C. sericeus Say. New Jersey, not common (Bt).

C. sobrinus Hald. Pennsylvania (Ashm).

ASCOGASTER Wesm.

A. pallidicornis Ashm. Jamesburg, Newark, VI, 16 (Sm).

A. rubripes Prov. Jamesburg, New Brunswick, VII, 20 (Sm).

PHANEROTOMA Wesm.

P. tibialis Hald. Pennsylvania (Ashm).

SPHÆROPYX Hal.

S. bicolor Cress. New York (Ashm).

Sub-family X AGATHIDINÆ.

Tribe I Agathidini.

CREMNOPS Först.

- C. hæmatodes* Brullé. "New Jersey" (Cress Coll).
C. liberator Brullé. Canada, Carolina (Cress).
C. semirubra Brullé. Clementon, V, 30 (Jn), "New Jersey" (Cress Coll).
C. vulgaris Cress. New Brunswick (Sm), Caldwell (Cr).

AGATHIS Latr.

- A. tibiator* Prov. New York (Ashm).
A. rubripes Cress. New York (Ashm).
A. perforator Prov. New York (Ashm).

Tribe II Microdini.

MICRODUS Nees.

- M. agilis* Cress. From larva of *Botis feudal*s, which is common in New Jersey.
M. annulipes Cress. Jamesburg, Woodbury, VI, 27 (Jn).
M. earinoides Cress. Massachusetts, Illinois (Cress).
M. perforator Prov. Pennsylvania (Jn).
M. imitatus Cress. "New Jersey" (Cress Coll).
M. simillimus Cress. "New Jersey" (Cress Coll).
M. johnsoni Ashm. Jamesburg (Jn).
M. texanus Cress. Cramer Hill, VI, 11, Westville, VI, 27 (Jn).
M. solidaginis Ashm. Clementon, V, 30, Riverton, IX, 5 (Jn).

EARINUS Wesm.

- E. limitaris* Say. Staten Island, April (Ds), New York, common (Ashm).

Sub-family XI CARDIOCHILINÆ.

CARDIOCHILES Nees = TOXONEURON Say.

- C. abdominalis* Say. Long Island, Linell (Ashm).
C. tibiator Say. Philadelphia (Ashm), Riverton, VIII, 14 (Jn).
C. apicalis Cress. Atco, VII, 4 (Sz), Del. Water Gap, VII, 15 (Jn).

Sub-family XII MICROGASTERINÆ.



Fig. 279.—Caterpillar covered with cocoons of *Microgaster*.

Among this series are many of those making oval white cocoons that cover the surface of infested caterpillars, particularly the larger Sphingidæ.

APANTELES Forst.

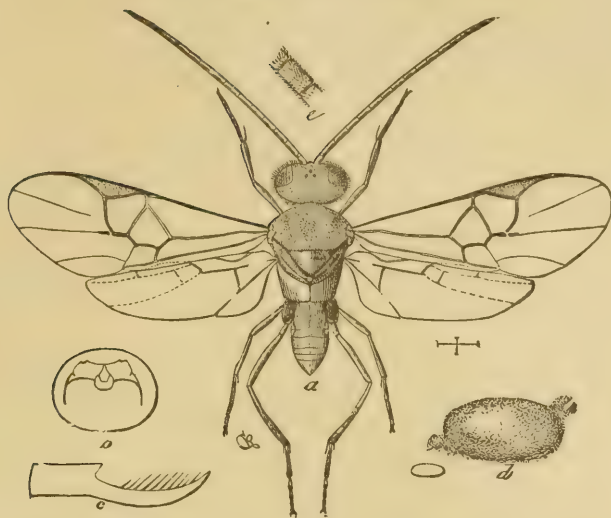


Fig. 280.—*Apanteles aletia*: parasite of the cotton moth, introduced to show the appearance of the insects.

- A. limenitidis* Riley. Philadelphia (Ashm).
- A. lunatus* Pack. Philadelphia (Ashm).
- A. scitulus* Riley. New York (Ashm).
- A. empretiæ* Ashm. New Jersey.
- A. acronyctæ* Riley. Bred from larva of *Acronycta obliqua* (Sm).
- A. glomeratus* Linné. Jamesburg, parasitic on *Pieris rapæ*, Riverton, V, 1 IX, 25 (Jn).
- A. congregatus* Say. Occurs in New Jersey, quite commonly (Sm).
- A. atalantæ* Pack. Philadelphia (Ashm).
- A. smerinthis* Riley. New Brunswick (Sm).
- A. xylina* Say. New Brunswick, bred from *Smerinthus geminatus* (Sm).

PSEUDAPANTELES Ashm.

- P. consimilis* Ashm. Long Island (Ashm).
- P. terminalis* Ashm. Long Island (Ashm).
- P. gallædiploppi* Ashm. New York (Ashm).
- P. robiniaæ* Fitch. New York (Ashm).

UROGASTER Ashm.

- U. crassicornis* Prov. Riverton, IX, 5 (Jn).
- U. forbesii* Ashm. Riverton, V, 30 (Jn).

U. hartii Ashm. Philadelphia, VIII, 28 (Jn).

U. carpatus Say. Parasite on the clothes moth *Tinea pellionella*; Atco, VI, 13 (Jn).

U. ensiger Say. Long Island (Ashm).

U. cacœciæ Riley. New Jersey, probably.

HYGROPLITIS Thoms.

H. rubricoxus Prov. Long Island (Ashm).

MICROGASTER Latr.

M. carinatus Pack. New York (Ashm).

M. gelechiæ Riley. Woodbury, VI, 27 (Jn).

HYPOMICROGASTER Ashm.

H. zonarius Say. New York (Ashm).

DIOLCOGASTER Ashm.

D. brevicaudus Prov. New York, Canada (Ashm), Philadelphia, VIII, 28 (Jn).

MICROPLITIS Först.

M. gortynæ Riley. New Jersey, probably.

M. ceratomiæ Riley. Newark, parasite on Smerinthid larva.

M. bicolor Ashm. Avalon, VI, 30 (Jn).

Sub-family XIII ICHNEUTINÆ.

ICHNEUTES Nees.

I. fulvipes Cress. New York (Ashm).

Sub-family XIV OPIINÆ.

ZETETES Först.

Z. laticinctus Ashm. New York (Ashm).

BIOSTERES Först.

B. anthomyiæ Ashm. New York (Ashm).

DESMIOSTOMA Först.

D. unifoveata Ashm. New York (Ashm).

D. floridanus Ashm. New Brunswick, VII (Sm).



Fig. 281. — Microgaster species.

Sub-family XV BRACONINÆ.

GLYPTOMORPHA Holm.

G. rugator Say. Clementon, VIII, 11, Westville, VI, 6 (Jn).

IPHIAULAX Först.

I. agrili Ashm. New York (Ashm).

I. eurygaster Brullé. New York (Ashm).

I. erythrogaster Brullé. Long Island (Ashm).

VIPIO Latr.

V. schwarzii Ashm. New York to Georgia (Ashm).

MELANOBRACON Ashm.

M. rugosiventris Ashm. Long Island (Ashm), Dover, VII, 16 (Jn).

M. charus Riley. Philadelphia, New York (Ashm).

M. simplex Cress. Avalon, VI, 30, Clementon, VIII, 11 (Jn), Staten Island, VII (Ds).

M. pectinator Say. New York (Ashm).

CÆLIODES Wesm.

C. pissodis Ashm. New Jersey, probably.

BRACON Fabr.

B. apicatus Prov. Pennsylvania, V, 17 (Jn).

B. scrutator Say. New York, Pennsylvania, common (Ashm).

B. euuræ Ashm. Delaware Co., Pennsylvania, IV, 26 (Jn).

B. nigropectus Prov. Ocean Co., V, (Sm).

B. xanthostigmus Cress. Widely distributed over the United States (Ashm), Clementon, V, 30, VI, 6, Westville, VI, 6, 9 (Jn).

B. mellitor Say. New Brunswick, VII, 20 (Sm).

B. catochæ Ashm. Atlantic Co., parasite in *Cephus 3-maculatus* (Sm).

B. cookii Ashm. Ocean Co., V (Sm).

B. pygmæus Prov. Jamesburg, VII, 15 (Sm).

MACRODYCTIUM Ashm.

M. gracilis Ashm. New York (Ashm).

M. flaviventris Ashm. Ocean Grove, V (Sm).

HABROBRACON Ashm.

H. gelechiæ Ashm. New York (Ashm).

H. hebetor Say. Occurs from Atlantic to the Pacific (Ashm), Cramer Hill, V, 21 (Jn).

Sub-family XVI RHOGADINÆ.

Tribe I Hecabolini.

HECABOLUS Curt.

- H. lycti* Cress. Pennsylvania (Cress).
H. minimus Cress. Pennsylvania (Cress).
H. utilis Cress. New York (Cress).

Tribe II Doryctini.

ODONTOBRACON Cam.

- O. bicolor* Ashm. Camden, VI, 30 (Jn).

DORYCTES Hal.

- D. pallipes* Prov. Pennsylvania (Ashm).
D. exhalans Say. Jamesburg, VII, 15 (Sm), widely distributed (Ashm).

Tribe III Rhogadini.

PELECYSTOMA Wesm.

- P. discoideus* Cress. New Brunswick, VII, 20 (Sm).

RHOGAS Nees.

- R. abdominalis* Cress. "New Jersey" (Cress).
R. aciculatus Cress. "New Jersey" (Cress Coll).
R. burrus Cress. New York, Canada (Ashm).
R. intermedius Cress. Ocean Co., V (Sm), Westville, IV, 19 (Jn).
R. lectus Cress. "New Jersey" (Cress).
R. terminalis Cress. Caldwell (Cr).
R. parasiticus Nort. Ocean Co. (Sm).
R. rileyi Cress. Clementon, V, 30 (Jn).
R. stigmator Say. Merchantville, III, 13 (Jn).

Tribe IV Rhyssalini.

RHYSSALUS Hal.

- R. atriceps* Ashm. Parasite on a Tortricid on apple trees.
R. loxotenix Ashm. Parasitic on *Loxotenia clemensiana*.

CLINOCENTRUS Hal.

- C. mellipes* Ashm. New Jersey, probably.

Tribe V Exothecini.

COLASTES Hal.

C. basilis Ashm. New Jersey, probably.

Sub-family XVII SPATHIINÆ.

Tribe I Pambolini.

SACTOPUS Ashm.

S. schwarzii Ashm. Anglesea, VII, 24 (Sz).

ECPHYLUS Först.

E. pallidus Ashm. Parasite in larva feeding on red-bud, *Cercis* (Ashm).

Tribe II Hormiini.

CHREMYLUS Hal.

C. terminalis Ashm. Widely distributed (Ashm).

DENDROSOTER Wesm.

D. agrili Ashm. Parasite on *Scolytus 5-spinosus* (Ashm).

CALLIHORMIUS Ashm.

C. stigmatus Ashm. Camden, VIII, 26 (Jn).

Tribe III Spathiini.

SPATHIUS Nees.

S. honestor Say. Long Island (Ashm).

S. simillimus Ashm. United States, widely distributed (Ashm).

S. canadensis Ashm. Widely distributed over United States (Ashm).

Family LXXIX STEPHANIDÆ.

STEPHANUS Jur.

S. cinctipes Cress. Pennsylvania, New York (Schletterer).

MEGISCHUS Brullé.

M. rufipes Say. Pennsylvania (Ashm).

Sub-order II PHYTOPHAGA.

Super-family IX SIRICOIDEA.

The species belonging to this sub order are always recognizable by having the abdomen joined at its base to the thorax for its full width. The larvæ are all plant feeders in one way or another, and the ovipositor is modified into a saw or borer-like structure. They are all more or less injurious when they feed on cultivated plants.

Family LXXX ORYSSIDÆ.

Large species in which the antennæ are situated just above the mandibles under a sharp edge, thorax and abdomen almost completely united so as to be immobile.

ORYSSUS Latr.

O. sayi Westw. "United States" (Cress).

O. terminalis Newm. Canada to Pennsylvania (Cress).

Family LXXXI SIRICIDÆ.

These are the boring types in which the ovipositor is prolonged into a stout augur, the head closely applied to the thorax, body hard and thoroughly chitinized.

SIREX Linn.

S. albicornis Fabr. = *abdominalis* Harris, male (pars), "United States" (Cress).

S. cressoni Nort. "New Jersey" (Cress).

S. flavicornis Fabr. = *abdominalis* Harris (pars) "United States" (Cress).

PAURURUS Konow.

P. cyaneus Fabr. Canada and United States (Cress).

P. edwardsii Brullé. "United States" (Cress).

P. nigricornis Fabr. "New Jersey" (Cress).

TREMEX Jur.

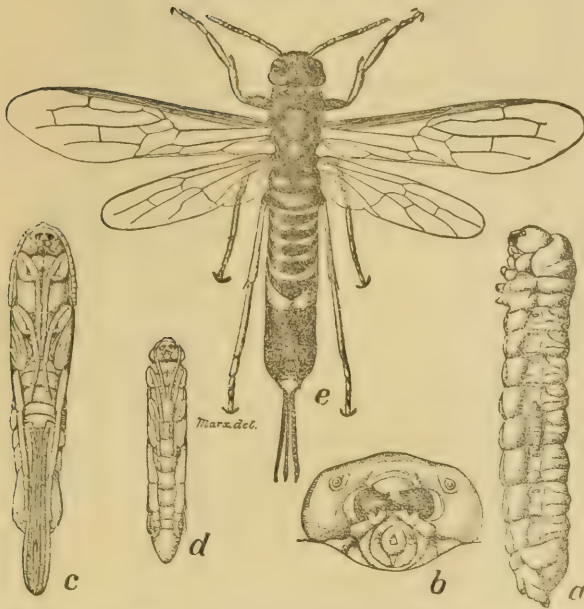


Fig. 282.—The Pigeon Tremex, *T. columba*: *a*, larva; *b*, its head enlarged; *c*, pupa of female; *d*, pupa of male; *e*, female adult.

T. columba Linn. The larva bores in the trunks of a variety of shade and orchard trees throughout the State; sometimes causing considerable injury. It is popularly known as the "pigeon *Tremex*," and no practical method of dealing with it is known. As it usually attacks weak or dying trees, however, we can lessen the danger of attack by keeping the trees in good condition.

T. sericeus Say. Pennsylvania (Ashm).

Family LXXXII XIPHYDRIIDÆ.

Smaller species in which there is quite a long neck between the head and thorax.

BRACHYXIPHUS Philippi.

B. rufiventris Cress Long Island (Ashm).

XIPHYDRIA Latr.

X. abdominalis Say. = *albicornis* Harr. Pennsylvania, Michigan to Texas (Cress).

X. erythrogaster Ashm. Avalon, VI, 30 (Jn).

X. tibialis Say. Atlantic Co., New Brunswick, IV, 19 (Sm).

KONOWIA Brauns.

K. attenuata Nort. "New Jersey" (Cress).

Family LXXXIII CEPHIDÆ.

These are loose jointed slender saw-flies of rather soft texture, with long, slender, peculiarly jointed antennæ. The ovipositor is a little produced and the larvæ live in the stems of plants and the tender growth of trees and shrubs.

ARIDUS Konow.

A. trimaculatus Say. Lahaway, VI, 29, Hammonton, IX (Sm), New Jersey, V, 18 (U S N M). The larva bores in the stems of blackberry canes, entering near the bottom and eating out the center to the tip.

JANUS Steph.

J. flaviventris Fitch. Long Island (Ashm).

ASTATUS Panz.

A. pygmæus Linn. The "wheat-stem borer," an introduced insect which has done considerable injury in New York, but has not yet been actually found in New Jersey. It may be expected to occur in the northern counties.

CALAMENTA Konow.

C. johnsoni Ashm. Riverton, V, 29 (Jn).

CEPHUS Latr.

C. abbreviatus Say. Pennsylvania (Cress).

C. integer Nort. Canada to New York (Cress).

Super-family X TENTHREDINOIDEA.

These are the saw-flies, in which the ovipositor of the female is modified into a pair of plates variably serrated at the edges, working between a pair of sheaths, which may be also grooved or toothed. They are usually rather compactly built, but not very hard species, head, thorax and abdomen of nearly



Fig. 284.



Fig. 285.



Fig. 283.



Fig. 286.

Fig. 283.—Blackberry stem borer, *Aridus trimaculatus*: *a*, larva; *b*, pupa; *c*, *d*, male and female adult.

Fig. 284.—Blackberry canes bored by the larva of *A. 3-maculatus*.

Fig. 285.—Raspberry canes bored by the larva of *A. 3-maculatus*.

Fig. 286.—Wheat stem saw-fly, *Astatus pygmaeus*: *a*, larva in outline; *b*, same, enlarged; *c*, larva in wheat stalk; *e*, adult, enlarged; *f*, a parasite infesting larva, also enlarged.

equal width, the wings folded over the abdomen when at rest, the secondaries with a broad anal lobe, making them wider than the primaries. The flies are usually sluggish, and many of them may be picked from the plants on which they rest with the fingers, making no attempt to escape.

The larvæ vary greatly in feeding habits, some forming galls, others live in stems, a few in fruits, and some mine leaves, while the majority live openly upon the plants on which they feed. In general they resemble caterpillars in form, but have at least five pairs of abdominal pro-legs. Many have the habit of curling the hinder portion of the body while feeding, and this is characteristic. The general term "slugs" is applied to these larvæ, and some of them become seriously injurious. They are usually kept in check without much trouble by using arsenical poisons or white hellebore, dry or in decoction, to which they are peculiarly susceptible. Against some of the slimy forms dry hydrate of lime or even very fine road-dust is satisfactorily available.

In this series the list owes much to Dr. Dyar, who has bred many of the species found near New York city and has very kindly permitted me to use his notes. He has also looked over the manuscripts and verified the food plants cited on his authority.

Family LXXXIV XYELIDÆ.

Sub-family I MACROXYELINÆ.

MACROXYELA Kirby.

M. ferruginea Say. New York (Ashm).

M. ænea Nort. Staten Island, III (Ds), larva on elm (Young).

MEGAXYELA Ashm.

M. major Cress. Fort Lee on hickory (Dyar).

ODONTOPHYES Konow.

O. aviingrata Dyar. Ft. Lee, Plainfield on hickory and butternut (Dyar).

Sub-family II XYELINÆ.

XYELA Dalm.

X. minor Nort. Riverton, IV, 17, Clementon, V, 19 (Jn), larva on pine (Dyar).

Family LXXXV LYDIDÆ.

LYDA Fabr.

L. apicalis Westw. "North America" (Westwood).

L. discolor Cress. Canada to Nevada (Cress).

- L. excavata* Nort. Canada. Maine, New York (Cress).
L. cerasi Riley. The common web-worm of wild cherry (Dyar).
L. plagiata Klug. Westville, VII, 2 (Jn), Anglesea, VII, 25 (Sm).

ITYCORSIA Konow.

- I. tessellata* Klug. Pennsylvania, Massachusetts (Cress).

CEPHALEIA Panz.

- C. simidea* Cress. New Jersey, probably.

NEUROTOMA Konow.

- N. fasciata* Nort. Atlantic Co., without date (Sm).

KELIDOPTERA Konow.

- K. multisignata* Nort. New Jersey, probably.

PAMPHILIUS Latr.

- P. ocreata* Say. Larva on hazel, *Corylus*, in a web, solitary (Dyar).
P. inconspicua Nort. Canada, New York, Pennsylvania (Cress).

BACTROCEROS Konow.

- B. pallimacula* Nort. Occurs in New York (Ashm).
B. n. sp. (Ashm) Ocean Co. (Sm).
B. luteicornis Nort. "United States" (Cress).

LIOLYDA Ashm.

- L. frontalis* Westw. Pennsylvania to Georgia (Ashm).

Family LXXXVI HYLOTOMIDÆ.

Sub-family I SCHIZOCERINÆ.

SCHIZOCERUS Lepel.

- S. prunivorus* Marl. Larva on wild cherry, Long Island (Dyar).
S. ebenus Nort. Feeds on leaves of sweet potatoes.
S. cellularis Say. Also a feeder on sweet potatoes.
S. johnsoni Ashm. Riverton, IX, 5 (Jn).
S. plumiger Klug. "United States" (Cress).
S. sericeus Nort. Canada to Illinois (Cress).

Sub-family II HYLOTOMINÆ.

HYLOTOMA Latr.

- H. abdominalis* Leach. Larva on willow (Dyar), Del. Water Gap, VII, 12 (Jn).
H. borealis Kirby. Del. Water Gap, VII, 8 (Jn).
H. cœrulea Nort. "United States" (Cress).
H. eximia Kirby. Clementon, V, 16 (Jn).
H. humeralis Beauv. Anglesea, V, 30, Lahaway, V, 28 (Sm), Jamesburg, VI, 16, larva on poison ivy (Dyar), Merchantville, VII, 19, Atlantic City, VII, 14 (Jn).
H. miniata Klug. Staten Island (Ds).
H. mcleayi Leach. Larva on wild cherry, Long Island (Dyar).
H. pectoralis Leach. Larva on birch (Dyar), Canada to Virginia.
H. rubiginosa Beauv. Atlantic Co., Lahaway, V, 28 (Sm).
H. rubra Klug. New York (Cress).
H. scapularis Klug. Caldwell (Cr), Newark in May, Anglesea, V, 28, New Brunswick, IV, 21 (Sm), Del. Water Gap, VII, 11 (Jn), larva on oak (Dyar).

MICRARGE Ashm.

- M. ruficollis* Nort. Delaware Water Gap, VII, 8 (Jn).
-

Family LXXXVII LOPHYRIDÆ.

LOPHYRUS Latr.

- L. abbottii* Leach. Jamesburg, Springfield, locally and seasonally common on pine (Sm).
L. akhurstii Nort. Described from New Jersey: also a pine feeder.
L. lecontei Fitch. Feeds on pine in New York.
L. abietis Harr. The larva on black spruce.
L. fabricii Leach. Larva on *Pinus rigida* (Dyar).
-

Family LXXXIX PTERYGOPHORIDÆ.

ACORDULECERA Say.

- A. dorsalis* Say. Ft. Lee, larva on young leaves of oak (Dyar), Riverton, VIII, 14, Clementon, V, 9, (Jn).
A. biclinius Konow. Ocean county (Sm).

Family XC SELANDRIIDÆ.**Sub-family I BLENNOCAMPINÆ.****FENUSA Leach.**

F. curta Nort. Leaf miner on swamp oak (Dyar).

F. ambigua Nort. Pennsylvania, Illinois (Cress).

KALIOSYSPHINGA Tischb.

K. melanopoda Cam. Leaf miner on alder (Dyar), Prospect Park, Brooklyn, IV, 2 (U S N M).

PERICLISTA Konow.

P. emarginata MacL. New York City, on *Q. coccinea* (Dyar).

P. subtruncata Dyar. New York City on *Q. coccinea* (Dyar).

P. medius Nort. Recorded from New Jersey: larva a spring slug on white oak (Dyar).

P. albicollis Nort. Larva on black oak, Bellport, L. I. (Dyar).

P. purpuridorsum Dyar. Larva on white oak, Bellport and Brookhaven, L. I., Pelham Manor, New York City, Washington, D. C. (Dyar).

ISODYCTIUM Ashm.

I. subgregarius Dyar. Larva on rock oak, *Quercus prinus*, Pelham Manor, N. Y., and generally on Long Island (Dyar).

I. infrequens Dyar. Larva on white oak, Brookhaven, L. I. (Dyar).

I. caryicolus Dyar. Ft. Lee, on Hickory (Dyar).

PHYMATOCERA Dahlb.

P. fumipennis Nort. "New Jersey" (Cress); larva on flowers of *Smilacina* (Yong).

P. nubilipennis Nort. "United States" (Cress).

P. rudis Nort. United States (Cress).

BLENNOCAMPA Hartig.

B. inhabilis Nort. Flatbush, Brooklyn, VI, I, probably on pear (U S N M).

B. capitalis Nort. New York (Cress).

B. pygmæa Say. Larva on grape, generally distributed throughout the State: never harmful in my experience.

MONOPHADNOIDES Ashm.

M. rubi Harr. The "raspberry saw-fly," common and sometimes seriously injurious to raspberry and blackberry plantations near Hammonton. The arsenites in mixtures of moderate strength should be used.

MONOPHADNUS Hartig.

- M. caryæ* Nort. The "hickory woolly worm," on hickory; quite common in 1897 at Plainfield, New Brunswick and other points.
M. tilizæ Nort. "New Jersey" (Cress).
M. marginicollis Nort. Massachusetts, New York (Cress).
M. bardus Say. Ft. Lee, on ash (Dyar).

Sub-family III SELANDRIINÆ.

SELANDRIA Leach.

- S. flavipes* Nort. South Jersey, no date (Sm), Riverton, V, 16, Westville, VI, 6 (Jn).

PERICLISTOPTERA Ashm.

- P. quercus-alba* Nort. Larva on white oak (Dyar), ranging from Massachusetts to Virginia.

ENDELOMYIA Ashm.

- E. rosæ* Harr. One of the common Rose saw-flies.

CALIROA Costa.

- C. obsoleta* Nort. Burlington Co., no date (Sm), larva on wild cherry (Dyar).
C. quercus-coccinea Dyar. Larva on black oak, Massachusetts and New York (Dyar).

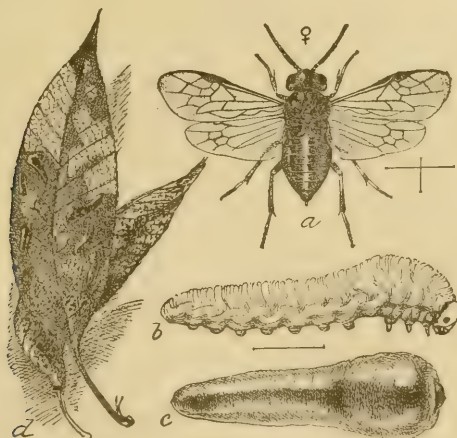


Fig. 287.—Pear slug, *Caliroa cerasi*: *a*, adult; *b*, *c*, larva from side and above, all enlarged; *d*, leaf eaten by larva, natural size.

- C. cerasi** Peck. The common cherry and pear slug which is sometimes seriously injurious to young or nursery trees throughout the State. Occurs also on *Amelanchier* and other plants. Easily controlled by dusting with dry hydrate or air-slaked lime, or spraying with the arsenites.

ERIOCAMPA Hartig.

- E. fasciata** Nort. Larva on oak (Dyar)
E. juglandis Fitch. Greenwood Lake, on butternut (Dyar). A woolly larva, sometimes common locally.

TETRANEURA Ashm.

- T. ignota** Nort. One of the strawberry saw-flies. It is sent in occasionally, but has not been, in my experience, destructive in New Jersey.

POECILOSTOMA Dahlb.

- P. obscurata** Cress. Sandy Hook in August (Sm).
P. coryli Dyar. On hazel, Van Cortland Park, New York City (Dyar).
P. inferentia Nort. South Haven, L. I., bred IV, 26, from larva on alder (Dyar).

PEOCILOSTOMIDEA Ashm.

- P. maculatus** Nort. Strawberry saw-fly: Sandy Hook, VII and VIII, Jamesburg, VII, 15, larva in destructive numbers, Lambertville, VII (Sm).

Sub-family IV HOPLOCAMPINÆ.

MELANOSELANDRIA Ashm.

- M. zabriskiei** Ashm. Delaware Water Gap, VII, 5 (Jn).

HOPLOCAMPA Ashm.

- H. halcyon** Nort. New York (Dyar), "United States" (Cress).

MACGILLIVRAYELLA Ashm. = **MACGILLIVRAYA** preoc.

- M. nigridorsum** Ashm. Clementon, V, 10 (Jn).

Family XCI NEMATIDÆ.

Sub-family I CLADIINÆ.

CLADIUS Ill.

- C. solitaris** Dyar. Larva on wild cherry, alder, etc. Occurs near New York City (Dyar).

C. pectinicornis Fourc. = *isomera* Nort. The larva is general on roses : the Spring rose saw-fly (Dyar).

PRIOPHORUS Dahlb.

P. æqualis Nort. Connecticut (Cress).

Sub-family II NEMATINÆ.

GYMNONYCHUS Marlatt.

G. appendiculatus Hartig. = *grossulariæ* Walsh. This is the gooseberry saw-fly, and is sometimes locally common.

PACHYNEMATUS Konow.

P. affinis Marl. Larva on grass : Greenwood Lake (Joutel).

P. corniger Nort. "New Jersey" (Cress Coll).

P. extensicornis Nort. The larva feeds on wheat "throughout the north-eastern United States" (Marlatt).

PRISTIPHORA Latr.

P. idiota Nort. = *identidem* Nort. The larva is said to be an "important enemy to the cranberry," and this is probably the species that is occasionally found in Atlantic county.

P. tibialis Nort. Long Island (Ashm).

P. sycophanta Walsh. Larva on willow, birch, *Vaccinium*, &c. (Dyar).

P. banksi Marl. Del. Water Gap, VII, 7, Clementon, V, 16, Atco, VI, 13 (Jn).

MICRONEMATUS Konow.

M. gregarius Marl. Englewood, on smooth-leaf willow (Dyar).

EUURA Newm.

E. orbitalis Nort. These species are gall-makers on willow (Dyar).

E. salicis-nodum Walsh. "United States" (Cress).

E. salicis-ovum Walsh. Gall on stems, not common (Bt).

PONTANIA Costa.

P. pallicornis Nort. Ft. Lee, on smooth-leaf willow, folding the leaves (Dyar).

P. robusta Marl. Ft. Lee, on poplar, folding the leaf (Dyar), Clementon, V, 9, 16 (Jn).

P. pisum Walsh. Makes a pea-like gall on willow leaves.

P. pomum Walsh. Gall-maker on bush willow, common (Bt).

P. hyalina Nort. Makes galls on willow leaves, "New Jersey" (U S N M).

- P. gracilis* Marl. Gall-maker on willow leaves, Van Cortland Park, N. Y. (Dyar), Virginia (Marl).
P. populi Marl. Slight gall-maker and leaf roller on *Populus grandidentata*, Ft. Lee (Dyar).
P. terminalis Marl. Slight gall-maker and leaf-roller on smooth willow, Van Cortland Park, N. Y. (Dyar).

PTERONUS Jur.

- P. ventralis* Say. Larva on willow ; "New Jersey" (Cress Coll).
P. erythrogaster Newn. New York to Maryland.
P. corylus Cress. Staten Island, VI (Ds), larva gregarious on alder (Dyar).
P. ribesii Scop. The larva is the common "currant worm," and is found wherever a currant or gooseberry bush grows: sometimes seriously destructive. Hellebore in decoction or dry is a specific. Arsenical sprays may also be used to good advantage before the fruit is too far advanced.
P. cornelli Marl. Staten Island, V and VI (Ds).
P. trilineatus Nort. Canada to So. Carolina, larva on locust.
P. quercus Marl. Larva on white oak, Belleport, L. I. (Dyar).
P. hyalinus Marl. Larva on white birch, Riverside Drive, N. Y. (Dyar).
P. thoracicus Harr. Larva on *Amelanchier* ; probably occurs in New Jersey (Dyar).
P. vertebratus Say. Larva on willow and poplar, Flatbush, L. I. (U S N M).
P. integer Say. "New Jersey" (Cress Coll) ; larva on oak, *Quercus tinctoria* (Dyar).
P. mendicus Walsh. Larva on willow, Central Park, N. Y., Washington, D. C. (Dyar).
P. longicornis Marl. Flatbush, L. I. (U S N M).
P. carpini Marl. Fort Lee, larva on hop-hornbeam (Dyar).
P. ostryæ Marl. Fort Lee, larva on blue beech (Dyar).

NEMATUS Jur.

- N. chloreus* Nort. Bellport, L. I., on *Quercus coccinea* (Dyar).

AMAURONEMATUS Konow.

- A. luteotergum* Nort. Larva on alder (Dyar).

CRÆSUS Leach.

- C. latitarsus* Nort. Larva on birch, gregarious (Dyar).

Family XCII DINEURIDÆ.**HEMICHROA** Curtis.

- H. americana* Prov. Larva on alder, gregarious (Dyar).
H. albidovaria Pack. Larva on black oak, Bellport, L. I. (Dyar).
H. phytophagica Dyar. Larva on white oak, Van Cortland Park, N. Y. (Dyar).
H. fraternalis Nort. Larva on white oak, Pelham Bay Park, N. Y. (Dyar).
-

Family XCIII TENTHREDINIDÆ.**Sub-family II DOLERINÆ.****DOLERUS** Jur.

- D. abdominalis* Nort. Caldwell (Cr) : all the larvæ in this genus are grass feeders, according to Dyar.
D. albifrons Nort. Caldwell (Cr).
D. aprilis Nort. Clementon, V, 10 (Jn), New Brunswick, V, and probably throughout the State (Sm).
D. arvensis Say. New Brunswick and elsewhere in the State, IV (Sm).
D. bicolor Beauv. Westville, IV, 19 (Jn), New Brunswick, IV, 21 (Sm).
D. collaris Say. Jamesburg, V, 4, common on that one day (Sm).
D. maculicollis Nort. "United States" (Cress).
D. sericeus Say. Anglesea, V, 30 (Sm), Long Island (Ashm).
D. unicolor Beauv. Caldwell (Cr).
D. similis Nort. Van Cortland Park, VI (Dyar), Clementon, V, 10 (Jn).

Sub-family III STRONGYLOGASTERINÆ.**STRONGYLOGASTER** Dahlb.

- S. multicinctus* Nort. Clementon, V, 30, Atco, VI, 4 (Jn).
S. tacitus Say. Massachusetts to Georgia, Sea Cliff, Long Island, July (U S N M).
S. luctuosus Prov. Larva on the brake, near New York (Joutel).

STRONGYLOGASTROIDEA Ashm.

- S. apicalis* Say. Larva on blackberry (Dyar), Clementon, V, 30 (Jn).
S. epicera Say. "New Jersey" (College Coll).
S. mellosus Nort. Clementon, V, 30 (Jn).

S. terminalis Say. Flatbush, L. I., VI, 28 (U S N M).

S. pallidicornis Nort. Jamesburg in June (Sm).

DIMORPHOPTERYX Ashm.

D. pinguis Nort. Larva on oak, maple, &c. (Dyar).

PSEUDOSIOBLA Ashm.

P. excavata Nort. Larva on button-bush (*Cephalanthus*) in early Spring, often defoliating the plants (Dyar), Westville (Jn), Ocean county in May (Sm).

PARASIOBLA Ashm.

P. rufocincta Nort. New Hampshire to Virginia (Cress).

APHILODYCTIUM Ashm.

A. multicolor Nort. Greenwood Lake, larva on alder and birch (Dyar), Atlantic county (Sm), Clementon, V, 30, Westville, VI, 6 (Jn).

HEMITAXONUS Ashm.

H. dubitatus Nort. Woodbury, VI, 7, Westville, V, 7 (Jn), larva on ferns (*Onoclea*), Ft. Lee (Dyar).

TAXONUS Hart.

T. amicus Nort. Anglesea, VII, 25 (Sm).

T. abnormis Prov. On yellow dock, 99th St., New York City (Dyar).

T. nigrisoma Nort. "United States" (Cress), Long Island (Ashm).

T. unicinctus Nort. Canada, Pennsylvania (Cress).

HYPOTAXONUS Ashm.

H. pallipes Say. "United States" (Cress).

HARPIPHORUS Hartig.

H. semicornus Say. "United States" (Cress).

H. tarsatus Say. Larva on Cornus (Dyar).

H. testaceus Nort. "United States" (Cress).

H. varianus Nort. Larva on Cornus (Dyar).

H. versicolor Nort. On Cornus, at Greenwood Lake (Dyar).

EMPHYTUS Klug.

E. apertus Nort. New York to Virginia (Cress).

E. cinctipes Nort. Larva on rose; Massachusetts to District of Columbia the curled rose saw-fly (Dyar).

- E. inornatus* Nort. Van Cortland Park, N. Y., VI, 4 (Dyar), Long Island (Ashm).
E. mellipes Nort. "United States" (Cress).

MACROPHYA Dahlb.

- M. albomaculata* Nort. United States (Cress).
M. epinota Say. "United States" (Cress), Long Island (Ashm).
M. externa Say. Caldwell (Cr), Bronx Park, on hickory (Dyar).
M. flavicoxæ Nort. "New Jersey" (Cress), larva on elder (Dyar).
M. formosa Klug. "New Jersey" (Cress), Del. Water Gap, VII, 9, Clementon, VI, 3 (Jn), New Brunswick (Sm).
M. fuliginea Nort. "United States" (Cress).
M. goniphora Say. "United States" (Cress), Long Island (Ashm).
M. incerta Nort. Flatbush, L. I., VI, 12 (U S N M).
M. intermedia Nort. "United States" (Cress), Anglesea (Jn).
M. lineata Nort. Long Island (Ashm).
M. nigra Nort. Woodbury, VI, 27 (Jn).
M. pannosa Say. "United States" (Cress), Long Island (Ashm).
M. proxima Nort. Long Island (Ashm).
M. pulchella Klug. Occurs on all land sides of New Jersey.
M. tibiator Nort. "New Jersey" (Cress Coll). Larva on elder, *Sambucus*, Van Cortland Park, N. Y. (Dyar).
M. trisyllaba Nort. Del. Water Gap, VII, 8 (Jn), "New Jersey" (Cress), larva on elder (Dyar).
M. trosula Nort. Atlantic Co., no date (Sm).
M. varia Nort. "United States" (Cress).

TENTHREDOPSIS Costa.

- T. atrovioleacea* Nort. "New Jersey" (Cress), Lahaway, VII, 3, Jamesburg, VI, 20 (Sm), Woodbury, VIII, 22 (Jn).
T. confusa Nort. "United States" (Cress).
T. semilutea Nort. "New Jersey" (Cress).
T. verticalis Say. Delaware Water Gap, VII, 11 (Jn).

PACHYPROTASIS Hart.

- P. omega* Nort. "United States" (Cress).

TENTHREDO Linn.

- T. angulata* Nort. "United States" (Cress).
T. angulifera Nort. "United States" (Cress).
T. eximia Nort. "United States" (Cress).
T. flavomarginis Nort. "United States" (Cress).

- T. grandis* Nort. "United States" (Cress).
T. lineata Prov. "United States" (Cress).
T. lobata Nort. "United States" (Cress).
T. mellina Nort. "United States" (Cress).
T. ruficolor Nort. "United States" (Cress).
T. rufipes Say. "United States" (Cress).
T. rufopectus Nort. "New Jersey" (Cress), Caldwell (Cr).
T. rufopedia Nort. Canada and New York (U S N M).
T. signata Nort. Canada and New York (U S N M).
T. tricolor Nort. "United States" (Cress).
T. verticalis Say. "United States" (Cress).

LABIDIA Prov.

- L. originalis* Nort. United States (Cress).
L. grandis Nort. New York to Virginia (U S N M).

ALLANTHUS Jur.

- A. basilaris* Say. "New Jersey" (College Coll).

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Family XCIV CIMBICIDÆ.

Sub-family I CIMBICINÆ.

TRICHIOSOMA Leach.

- T. triangulum* Kirby. Larva on willow, wild cherry, &c. (Dyar), "United States" (Cress).

Sub-family II ABIINÆ.

ZARÆA Leach.

- Z. americana* Cress. Larva on honey-suckle: ranges from Canada to Missouri and California.
Z. inflata Nort. Connecticut, Illinois (Cress).

ABIA Leach.

- A. cerasi* Fitch. New York (Cress).
A. kennicottii Nort. New Brunswick, no date (Sm).

CIMBEX Oliv.

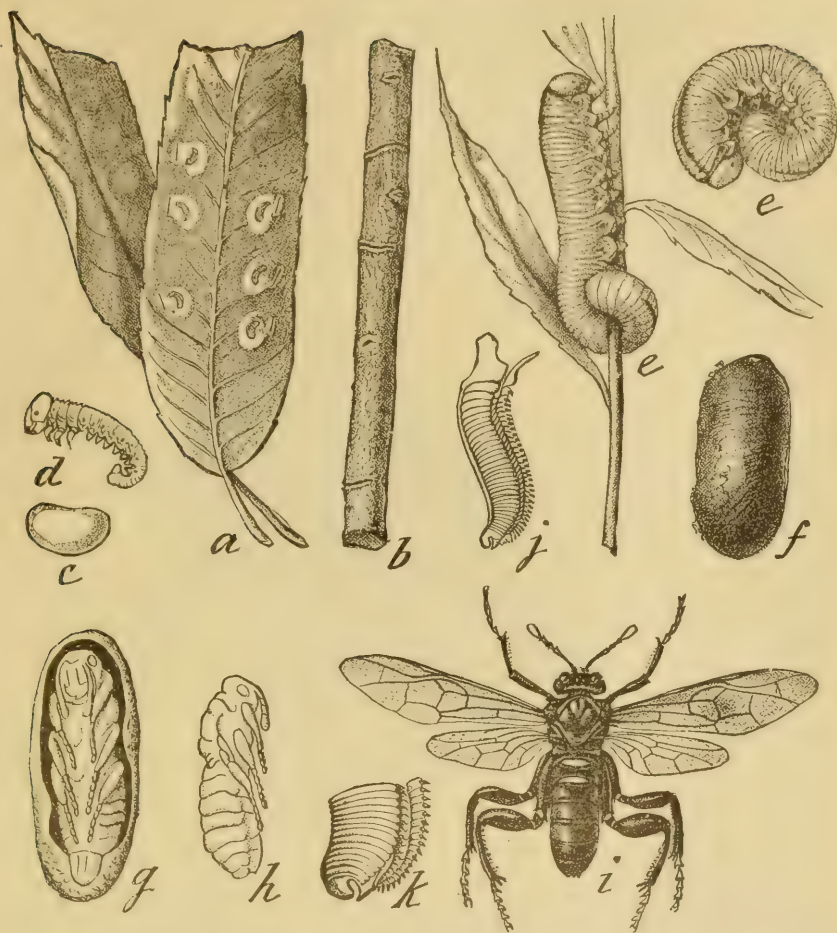


Fig. 288.—Willow saw-fly, *Cimbex americana*; *a*, willow leaf, showing egg-blisters; *b*, twig with girdlings; *c*, egg, enlarged; *d*, newly-hatched larva, enlarged; *e*, *e*, larvæ; *f*, cocoon; *g*, same, cut open to show pupa; *h*, pupa; *i*, male adult; *j*, *k*, ovipositor of female and its tip, enlarged.

C. americana Leach. The larva is found throughout the State on willow, elm, poplar and linden, though chiefly on willow. The imago is seldom seen. Woodbury, VI (Jn), Caldwell (Cr), Newark, Ft. Lee (Bt).

ORDER SIPHONAPTERA.

Contains the fleas which are associated with the *Diptera* or flies, because of the similarity in the early stages, though the adults, because of their parasitic mode of life, have lost all trace of wings. Fleas are usually brown in color, transversely flattened, the edges of the segments set with stiff spines directed backward, and the hind legs enormously developed for leaping.

They drop their eggs in the sleeping quarters, den or nest of their host, and from them hatch slender, white, worm-like larvæ. These feed on refuse animal or vegetable debris found in such places, and the pupa hides in crevices or in houses in the cracks between the boards of floors.



Fig. 289.—Rabbit-flea : much enlarged.

Sometimes a house will become over-run with fleas, and in such cases the sleeping quarters of the dog or cat must be thoroughly cleared out so as to destroy all breeding places. The dog or cat must be washed with carbolic soap to rid it of fleas, and may then be used as a trap. All the fleas will find their way to him or her sooner or later, and by washing every other day for two or three weeks they will be all destroyed. If breeding in the floor cracks is suspected, use gasoline to destroy larvæ and even eggs.

If the cat objects to being washed, use pyrethrum well rubbed into the fur at short intervals until no more fleas are found. If she still objects, radical measures are indicated.

Family PULICIDÆ.**PULEX Linn.**

P. irritans Linn. The common house flea.

P. howardi Baker. Found on mice and squirrels, from New York to Georgia and west to Nebraska.

P. serratriceps Gervais. This is the common cat and dog flea which occurs everywhere.

There are undoubtedly many other species occurring on rats, mice, bats, rabbits, &c., but no collections have been made: the order is not so well represented with us, however, as it is in warmer countries.

ORDER DIPTERA.

This order contains the flies, always recognizable by having two wings only, the secondaries being reduced to little knobs or halteres. The head is separated from the thorax by a distinct narrow neck, and the antennæ are either quite long or very short and aristate. The mouth is formed for scraping or sucking or both, never for biting, in the adult stage. The larvæ vary greatly in form, but are usually either very slender and elongate or maggot-like in form. The metamorphosis is complete, and the change between larva and adult is more radical than in any other insect.

The flies contain many injurious or annoying forms, and a few that are beneficial because as scavengers they remove or hasten the decay of large animals.

Our collections are small and most of those listed here have been collected or named by Mr. C. W. Johnson, of the Wagner Free Institute, Philadelphia, Pa. Mr. Johnson has also prepared the following list in this order in its entirety, and should be considered authority for all notes not otherwise bracketed. The descriptive remarks under family headings and the economic suggestions are my own.

Mr. Johnson writes in explanation and acknowledgment as follows :

"It has given me great pleasure to assist Prof. Smith in preparing this list of *Diptera*. The work on my own part consists of a record of all the species collected in various portions of the State since I took up the study of this order in the Spring of 1891. All data, therefore, unless immediately followed by the name of the collector, are my own. I regret the unsatisfactory condition of the *Cecidomyidæ*, *Sarcophagidæ* and *Anthomyidæ*; but it seems impossible, at the present time, to do better. Careful collecting in all portions of the State at various seasons will probably show that the present list, which numbers about 1,200 species, will represent only about two-thirds of the actual number found within the State.

"I here wish to express my sincere thanks to Mr. D. W. Coquillett for his ever kind assistance in determining the species in the more difficult families; also to Prof. J. M. Aldrich and Prof. W. M. Wheeler for determining the *Dolichopodidæ*, and to Dr. G. de N. Hough for classifying the *Muscidæ*. Dr. E. G. Love and Mr. M. S. Crane kindly sent their entire collection to me for study, while Messrs. S. T. Kemp, C. T. Greene, H. S. Viereck, H. W. Wenzel, Chas. Liebeck, Philip Laurent, Philip Nell, H. Hornig, Dr. H. Skinner and others have contributed many additional species.

"CHAS. W. JOHNSON.

"Wagner Free Institute of Science, Philadelphia, Pa."

Family CECIDOMYIDÆ.

Small, slender, mosquito like flies, with broad wings, long, cylindrical or bead-like antennæ, and small, poorly developed mouth parts. As a whole they are rather fragile in appearance, the males often with whorls of long hair on the antennal joints. They are popularly known as "gall gnats," or "midges," and contain some of our most troublesome species. The larvæ are small oval grubs, bluntly pointed at both ends, often with a chitinous process on the under side called a breast bone. Their habits in the larval stage are very diverse, but almost always they feed on growing vegetation, and are actually or potentially injurious. Many form more or less obvious galls, and often they live in colonies. Their methods of attack vary, and the treatment to be adopted must be suited to each individual case. Insecticides are often unavailable, and a modification of the ordinary farm practice is necessary to reach the pests.

CECIDOMYIA Meigen.

C. destructor Say. "The Hessian fly" sometimes does great damage to wheat, chiefly north of the red shale line. Remedial measures are, chiefly, planting a scant early trap-crop in late August or early September; turning this under in late September and planting the main crop immediately thereafter.



Fig. 291.—*Cecidomyia oxycoccana*, the cranberry "tip-worm": much enlarged.



Fig. 290.—The Hessian fly, *Cecidomyia destructor*: on the left a healthy stalk of wheat, and on the right one infested at *h* by the "fly," showing galls; *a*, egg; *b*, larva; *c*, flaxseed; *d*, pupa; all very much enlarged; *e*, fly ovipositing on leaf, natural size; *f*, female; *g*, male fly, much enlarged; *i*, the parasite, *Merisus destructor*; also much enlarged.

- C. oxycoccana* Johns. (*C. vaccinii* Sm., not Osten Sacken.) Infests the terminal growth of the cranberry (*Oxycoccus*), sometimes doing considerable injury : also frequents the loose-strife, *Lysimachia* (Sm).
- C. solidaginis* Loew. Common on golden-rod, *Solidago*, everywhere (Bt), Clementon, VIII.
- C. serrulata* O. S. Common, galls on terminal buds of the alder, *Alnus serrulatus* (Bt).
- C. pseudoacaciæ* Fitch. Common on locust, *Robinia pseudoacacia*, at New Brunswick (Sm).
- C. gleditschiæ* O. S. Common on the leaves of honey locust, *Gleditschia triacanthos* (Bt), New Brunswick (Sm).
- C. strobiloides* O. S. Common, Englewood on low willows (Bt) Del. Water Gap, VI.
- C. brassicoides* Walsh. On willow : common near Fort Lee (Bt), I have seen the galls occasionally (Sm).
- C. batatas* Walsh. Fort Lee on branches of willow, *Salix discolor*, and allied species (Bt).
- C. leguminicola* Lint. The clover seed midge.

Cecidomyiæ Known by Their Galls and Larvæ Only.

- C. caryæcola* O. S. Common near Fort Lee on various species of hickories (Bt), Riverton, IX.
- C. tubicola* O. S. Common, Fort Lee on underside of hickory leaves (Bt), common, Jamesburg and Lahaway (Sm), Riverton, IX.
- C. holotrichæ* O. S. Common, Ft. Lee on leaves of shellbark hickories (Bt), Riverton, IX.
- C. persicoides* O. S. Under side of hickory leaves, New Brunswick, Chimney Rock, Bound Brook (Sm).
- C. sanguinolenta* O. S. Common, Fort Lee, on hickory leaves in July (Bt).
- C. verrucicola* O. S. On leaves of linden, *Tilia americana* (Bt), New Brunswick and frequently elsewhere in the State (Sm).
- C. tulipifera* O. S. Short Hills ; the gall occurs on the mid-rib of the leaf of the tulip-tree, *Liriodendron tulipifera* (Bt).
- C. liriodendri* O. S. Common on the leaves of *Liriodendron* (Bt).
- C. serotinæ* O. S. Terminal buds of wild cherry, *Cerasus serotina* in May (Bt).
- C. pellex* O. S. Ft. Lee on leaves of ash, in June (Bt).
- C. rigidæ* O. S. Common on the tips of willow twigs (Bt).
- C. clavula* Bt. Common on the terminal twigs of dog-wood, *Cornus* (Bt).
- C. umbellicola* O. S. South Orange (O S), among the umbels of the elder, *Sambucus canadensis*.
- C. pillulæ* Walsh. Common on the leaves of oaks (Bt), Clementon, VII and VIII.
- C. poculum* O. S. Very common (Bt), the so-called "Oak spangle" of Fitch.

- C. niveipila* O. S. Staten Island, V, on young leaves of the red oak (Bt), Riverton, VI.
- C. carbonifera* O. S. Common in August on leaves of golden rod, *Solidago* (Bt).
- C. viticola* O. S. Bergen County on leaves of wild grape (Bt), Vincentown (U S Ag).
- C. vitis-pomum* Walsh and Riley. Riverton, on wild grape, Atlantic City (Nell), Fort Lee (Bt), Lahaway, New Brunswick and elsewhere, common early in the summer (Sm).
- C. impatientis* O. S. Succulent swellings at the base of the flowers of *Impatiens fulva*, Englewood, VIII (Bt).
- C. vaccinii* O. S. Large cockscomb-shape galls on leaves of the huckleberry, *Vaccinium*, Dover, Morris Plains, Clementon.

DIPLOSIS Loew.

[See Figs. 292, 293 and 294, next page.]

- D. tritici* Kirby. Was reported as injuring wheat in Mercer, Warren and Sussex Counties during the season of 1889 (Sm).
- D. pini-inopsis* O. Sacken. Jamesburg, V, on scrub pine, *Pinus inops* (Sm), Riverton, VII, 30, IX, 17.
- D. pyrivora* Riley. The "pear midge." Infests pears, causing an irregular lumpy growth, the larvæ eating out the core; cultivate frequently in early summer and, on light soil, put on a heavy top dressing of kainit, middle of June.

LASIOPTERA Meigen.

- L. vitis* O. Sacken. Swellings of the stems and leaf stalks of wild grape, Shiloh, Riverton, Irvington (U S Ag).
- L. farinosa* O. S. Makes galls on the shoots of blackberry: local in Atlantic County, and not injurious.

Family MYCETOPHILIDÆ.

These are fungus-gnats, also resembling mosquitoes or midges, but the antennæ are not verticillate or furnished with whorls of hair. In the male the abdomen ends in a forceps-like process, and in the female in a pointed ovipositor. There are other structural differences to characterize the family, but these are not easily seen except by the student. The larvæ are feeders in fungus and in decaying vegetation generally, and might be considered at worst harmless were it not that they attack cultivated mushrooms. The larvæ are white, slender, have a black head, and often live in large colonies. Some of

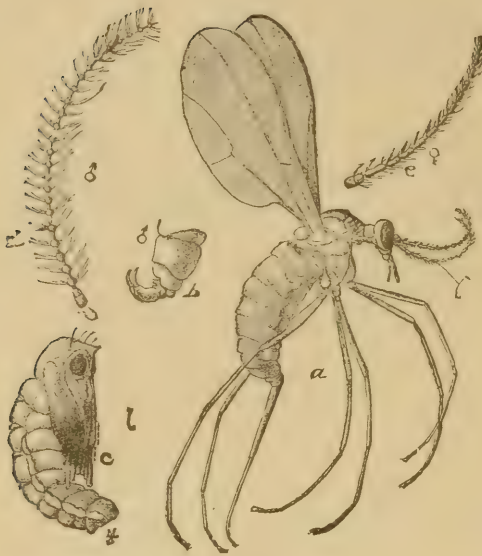


Fig. 292.

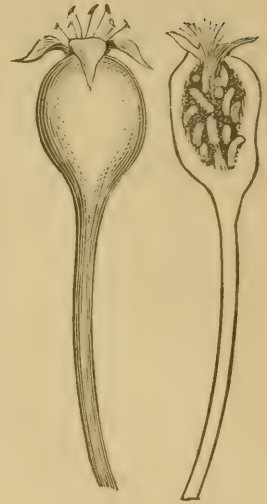


Fig. 293.



Fig. 294.

Fig. 292.—Pear midge, *Diplosis pyrivora*; *a*, female adult; *c*, pupa, both enlarged: all other references to structural details.

Fig. 293.—A sound pear and one infested by the larvæ of the pear midge.

Fig. 294.—A series of pears infested by the midge, showing distortions caused by larvæ.

them have the curious habit of forming great rope-like masses when ready to enter the pupal stage, travelling considerable distances sometimes to find a suitable place.

Where they occur in mushroom beds, fumigating frequently with tobacco or pyrethrum to kill the adults inside, and keeping all windows closely screened to prevent the entrance of specimens from outside, is the only practical measure known to me.

MACROCERA Meig.

M. clara Loew. Dunnfield, Del. Water Gap, VII, 8, 13, Clementon, VIII, 9.

M. formosa Loew. Merchantville, V, 28, Del. Water Gap, VII, 12, Clementon, VIII, 9.

M. nebulosa Coq. Clementon, VI, 3, VIII, 9.

M. hirsuta Loew. Dunnfield, Del. Water Gap, VII, 11.

PLATYURA Meig.

P. diluta Loew. Dunnfield, Del. Water Gap, VII, 11, 15.

P. mendosa Loew. Clementon, V, 30.

P. tæniata Winn. Dunnfield, Del. Water Gap, VII, 12.

P. elegans Coq. Shark River, VII, 12.

P. inops Coq. Dunnfield, Del. Water Gap, VII, 8, 12.

P. clausa Coq. New Brunswick (Sm).

P. melasoma Loew. Del. Water Gap, VII, 12.

ASYNDULUM Latr.

A. montanum Røeder. Dunnfield, Del. Water Gap, VII, 11, 15.

NEOEMPHERIA O. S.

N. balioptera Loew. Princeton, VII, 21, Westville, VIII, 23.

N. nepticula Loew. Merchantville, VI, 28.

N. didyma Loew. Woodbury, VI, 7.

POLYLEPTA Winn.

P. tibialis Coq. Westville, VI, 6, Dunnfield, Del. Water Gap, VII, 8.

SCIOPHILA Meigen.

S. littoralis Say. Dover, VI, 17, Merchantville, VI, 28, Del. Water Gap, VII, 8, 13, Westville, VII, 21, Clementon, VI, 3 (Ju), New Brunswick, VII, 20 (Sm).

HESPERODES Coquillett.

H. johnsoni Coq. Delaware Water Gap, VII, 12.

SYNTEMNA Winn.

S. polyzona Loew. Clementon, VI, 3.

BOLETINA Stæger.

- B. tricineta* Loew. Clementon, VI, 3, Dunnfield, Del. Water Gap, VII, 15,
Dover, VII, 17.
B. groenlandica Stæg. Merchantville, III, 13 (Viereck).

NEOGLAPHYROPTERA O. S.

- N. bivittata* Say. Atco, VII, 12, Princeton, VII, 21 (Jn), Fort Lee, V (Love),
Jamesburg, VII, 4.
N. opima Loew. Dover, VI, 17, Merchantville, VI, 28.
N. sublunata Loew. Merchantville, VI, 28.

LEJA Meigen.

- L. ventralis* Say. Dunnfield, Del. Water Gap, VII, 8, 15.

ACNEMIA Winn.

- A. flaveola* Coq. Dunnfield, Del. Water Gap, VII, 11.

TRICHONTA Winn.

- T. perspicua* V. d. W. Riverton, IV, 16.

EXECHIA Winn.

- E. analis* Coq. Dunnfield, Del. Water Gap, VII, 8.

SEMMERUS Wlk.

- S. annulatus* Meig. Riverton, IV, 19.

LEPTOMORPHUS Curt.

- L. parvulus* Coq. Dunnfield, Del. Water Gap, VII, 12.

EPICYPTA Winn.

- E. punctum* Stann. Dunnfield, Del. Water Gap, VII, 15.
E. pulicaria Loew. Riverton, IV, 19.

MYCETOPHILA Meigen.

- M. punctata* Meig. Riverton, III, 20.
M. scalaris Loew. Riverton, III, 6, Clementon, V, 10, Del. Water Gap,
VII, 8.
M. sigmoides Loew. Riverton, III, 6, Delaware Water Gap, VII, 8.
M. contigua Walk. Riverton, III, 6, IX, 9.
M. obscura Walk. Riverton, III, 6, Clementon, VI, 16, Merchantville, VI,
28.

SCIARA Meigen.

- S. fulvicauda* Felt. Types from Atlantic Co., bred from decayed blackberry roots (Sm).
S. pauciseta Felt. New Brunswick, types bred from decaying potatoes, IX, 1895 (Sm).
S. multiseta Felt. New Brunswick, types bred from mushrooms, V, and this is the common species in mushroom cellars with us (Sm).
S. ocellaris Osten Sacken. On leaves of red maple, New Brunswick, Jamesburg (Sm), Riverton, VI.
S. polita Say. Clementon, V, 30.
S. inconstans Fitch. Clementon, VI, 3, Riverton, II, 26.
S. abbreviata Walk. Anglesea, VII, 12 (Sm).
S. fuliginosa Fitch. Palisades (Love).
S. sp. Fort Lee, IV, V (Love).
-

Family CULICIDÆ.

This family contains the mosquitoes, which need no special introduction to the Jerseyman, though there are some parts of our State practically free from them. They occur in countless millions, however, in the brackish and salt marshes along shore and in the swamps of the pine district. The larvæ live in stagnant water, and a very small quantity of it suffices. They are called wrigglers because of the way in which they jerk themselves round, and any number of them may be found, where mosquitoes occur, in any rain barrel.

In the larval stage the insect is at least harmless, and is probably beneficial because it is a scavenger and often removes foul material from water that is used for household purposes.

The mosquito problem in New Jersey is ready for solution whenever funds sufficient to carry out the necessary work may be made available.

Meanwhile a film of kerosene on ponds, in pools or swampy localities in which mosquitoes are known to breed will capture many of the adults that are ovipositing, and will also take care of the larva as it comes to the surface to breathe. Of course the insects are not agriculturally important.

Oil of Citronella will serve as an excellent repellant used on hands, face or other exposed parts, and it is quite lasting.

CULEX Linn.

- C. tæniorhynchus* Wied. The most common mosquito of the coast, V to IX.
C. excitans Walk. Anglesea, V, 28 (Sm).
C. pungens Wied. New Brunswick, VIII, 29 (Sm), Riverton, IX, 5.
C. triseriatus Say. Westville, VI, 27, Dunnfield, Del. Water Gap, VII, 12, 15.

C. impiger Walk. Del. Water Gap, VII, 14, Riverton, IX, 9 (Jn), New Brunswick, VII, 29 (Sm).

C. stimulans Walk. Caldwell, V, 15, 18 (Cr), Anglesea, V, 28 (Sm), Palisades, VI, 7 (Love).

PSOROPHORA Desv.

P. ciliatus Fabr. Westville, IX, 13, Anglesea, VIII, 15 (Jn), Orange Mts. (Sm).

ANOPHELES Meig.

A. punctipennis Say. Westville, VI, 27, Riverton, V, 28.

A. quadrimaculatus Say. Riverton, VII, 30, IX, 4 (Jn), Caldwell (Cr).

CORETHRA Meig.

C. punctipennis Say. Riverton, VI, 19.

It is probable that most of these occur throughout the State; but the ordinary fate of a mosquito is not that of being carefully bottled or pinned: therefore our collections are not so good as they might be.

Family CHIRONOMIDÆ.

These flies are indifferently named "gnats," "midges," "sand-flies" or "punkies," the latter two names chiefly applied to the few minute forms with piercing mouth parts. They resemble mosquitoes in appearance, but have naked wings, and the thorax is produced so as to hide the small head from above. The antennæ in the male are lengthily plumose and in the female are also furnished with lateral hair. The insects occur at all seasons, many of them in spring, and they have the habit of dancing in the early evening in great swarms only a few feet above ground, usually in a damp locality. The larvæ live in water on living or dead vegetation, or on sap of trees, under fallen leaves or decaying vegetable matter.

As a rule they are harmless, except for the annoyance caused by the biting tribes, but the larva of one species at least mines the leaves of water plants and thus becomes injurious in a very limited and special way.

CHIRONOMUS Meigen.

C. brunneus Walk. Dover, VII, 16.

C. cristatus Fabr. Common, Westville, VI, 6, Clementon, V, 10, Riverton, III, 20, Shark River, VII, 12 (Jn), New Brunswick (Sm).

C. jucundus Walk. Riverton, VIII, 21.

C. lineola Wied. Common, Westville, VI, 6, VII, 4, VIII, 13.

C. modestus Say. Westville, VIII, 13, Riverton, V, 14.

- C. pedestris* Meig. Dunnfield, Del. Water Gap, VII, 8, 12.
C. dispar Meig. Clementon, VI, 3, VIII, 11.
C. brachialis Coq. Westville, VI, 21, Asbury Park, VIII, 16.
C. pedellus De Geer. Clementon, VI, 3, Riverton, IV, 30, V, 14.
C. fascipennis Zett. Clementon, VI, 3, Riverton, V, 14, Del. Water Gap, VI, 12.
C. tæniapennis Coq. Dunnfield, Del. Water Gap, VII, 8.
C. albipennis Meig.? Westville, June 6, Riverton, VI, 17-20.
C. tendens Fabr. Clementon, VI, 3, Riverton, IV, 30.
C. viridicollis V. d. W.? Riverton, IV, 30.
C. nitidulus Coq. Riverton, V, 14.
C. tenellus Zett.? Delaware Water Gap, VI, 12.

CRICOPTOPUS V. d. Wulp.

- C. sylvestris* Fabr. Dreer's water garden, Riverton, VI, 9, larvæ injure leaves of *Victoria regia* (Sm), Westville, VI, 6 (Jn), Anglesea, V, 28 (Sm).
C. geminatus Say. Riverton, June 16-18.
C. tremulus Linn. Dunnfield, Del. Water Gap, VII, 8-12, Riverton, V, 14.

CAMPTOCLADIUS V. d. Wulp.

- C. byssinus* Schrank. Riverton, IV, 30.

ORTHOCLADIUS V. d. Wulp.

- O. nivoriundus* Fitch. Shark River, VII, 12, Riverton, IV, 15.
O. par Coq. Riverton, VII, 3.

EURYCNEMUS V. d. Wulp.

- E. scitulus* Coq. Riverton, IV, 30.

TANYPUS Meigen.

- T. melanops* Meig. Riverton, V, 14, Westville, VI, 6, Clementon, VI, 3.
T. pilosellus Loew. Riverton, VI, 30.
T. scapularis Loew. Riverton, VII, 24.
T. johnsoni Coq. Riverton, IV, 30, VI, 18.
T. thoracicus Loew. Westville, VII, 21, Riverton, VI, 19.
T. baltimoreus Macq. Riverton, V, 14, VI, 18.
T. annulatus Say. New Jersey (Crn Am. Ent. Soc).
T. monilis Linn. Riverton, V, 14, IX, 5.

CERATOPOGON Meigen.

- C. mundus** Coq. Riverton, VI, 16.
C. argentatus Loew. Princeton, VII, 21, Westville, VII, 29.
C. pulvereus Coq. Riverton, VII, 3.
C. bimaculatus Loew. Westville, VII, 21, Riverton, VI, 6.
C. flavipes Meig. Woodbury, V, 14, Del. Water Gap, VII, 8.
C. plebejus Loew. Westville, VII, 21.
C. elegans Coq. Riverton, V, 14.
C. trivialis Loew. Clementon, VI, 3, Westville, VI, 27, Princeton, VII, 21.
C. fuscus Coq. Riverton, IV, 30.
C. rufus Loew. Westville, VII, 27, Atco, VI, 4, Newark, VI, 13.
C. viridis Coq. Riverton, VI, 16.
C. longipennis Loew. Westville, VI, 27.
C. tibialis Meig. Woodbury, VI, 7.
C. transiens Walk. Riverton, VIII, 21.
C. lineatus Meig. Westville, VI, 6.
C. setulosus Loew. "New Jersey" (Crn, Am Ent Soc), Riverton, VII, 3.
C. variipennis Coq. Westville, VI, 2.
C. albaria Coq. Del. Water Gap, VII, 12.
C. albiventris Loew. Riverton, VI, 16.
C. festivus Loew. "New Jersey" (Crn, Am Ent Soc).
C. nebulosus Coq. Riverton, VI, 19.
C. piceus Winn.? Clementon, V, 16 (Jn), Atlantic Highlands, VII, 1 (Love).
C. diversus Coq. Riverton, VII, 7.

HETEROMYIA Say.

- H. fasciata** Say. Westville, VI, 15, VII, 2, Camden, VI, 6, Buena Vista, VI, 9 (Li), Riverton, VI, 16-20.
-

Family STENOXENIDÆ.**STENOXENUS** Coq.

- S. johnsoni** Coq. Type of the family and genus was collected at Dunnfield, Del. Water Gap, VII, 11, 1898: very rare, and habits in early stages unknown.

Family TIPULIDÆ.Fig. 295.—A crane fly, *Pachyrrhina* Sp.

These are the "Crane-flies," which resemble exaggerated mosquitoes in appearance, and derive their common name from their immensely long, ungainly, slender legs. The head is often prolonged into a sort of blunt snout, at the end of which are the prominent palpi, which are sometimes as long as the antennæ.

The species are most common in low meadows or at the edges of woodland, and their flight is as uncertain and awkward as their appearance. One of the prettiest species is *Bittacomorpha clavipes*, which is not uncommon along ditches in cranberry bogs. It is contrastingly marked with black and white, and the legs are enlarged at the tips of the separate joints. It is difficult to preserve these insects because the legs break off at the least provocation, even when they are alive. Thus far we have been unable to find any satisfactory use for these unreasonably long members, which in the males are sometimes longer than in the females.

The larvæ of most of these flies are slender, cylindrical, worm-like, and very tough, whence they are known as "wire worms" in England, where they are often injurious in sod land and on root crops. This type lives in the soil, and may feed on either living or dead vegetation. A few feed on leaves and somewhat resemble caterpillars, but in no case are they injurious in New Jersey, so far as I have had any knowledge of them.

DICRANOMYIA Steph.

- D. rara* O. S. Dover, VI, 23.
D. liberta O. S. Jamesburg (Sm), Clementon, VI, 3.
D. stulta O. S. "New Jersey" (Am Ent Soc).
D. morioides O. S. "New Jersey" (Am Ent Soc).
D. pubipennis O. S. "New Jersey" (Bt).
D. defuncta O. S. Caldwell, VI, 8 (Cr).
D. hæretica O. S. Jamesburg (Sm), Caldwell (Cr).

GERANOMYIA Haliday.

- G. rostrata* Say. Lenola, Clementon, V, 30, Riverton, VII, 3, IX, 11.
G. canadensis Westw. "New Jersey" (Am Ent Soc).
G. diversa O. S. "New Jersey" (Am Ent Soc).

RHIPIDIA Meig.

- R. maculata* Meig. "New Jersey" (Am Ent Soc).
R. domestica O. S. Palisades (O S), Clementon, V, 16, bred from larvæ obtained in fermented sap of *Nyssa sylvatica*, Riverton, VI, 16.

LIMNOBIA Meig.

- L. immatura* O. S. Caldwell (Cr).
L. cinctipes Say. Caldwell (Cr).
L. triocellata O. S. Westville, VI, 6, Dunnfield, Del. Water Gap, VII, Asbury Park, VIII, 16.
L. solitaria O. S. Dunnfield, Del. Water Gap, VII, 14.
L. tristigma O. S. Dunnfield, Del. Water Gap, VII, 11.
L. sociabilis O. S. Caldwell (Cr).

TROCHOBOLA O. S.

- T. argus* Say. Palisades V (Love).

RHAMPHIDIA Meig.

- R. flavipes* Macq. Clementon, VI, 3, Riverton, VII, 31, VIII, 25.

ELEPHANTOMYIA O. S.

- E. westwoodi* O. S. Delaware Water Gap, VII, 12.

TOXORRHINA Loew.

- T. magna* O. S. Type "New Jersey," VII (Cress, Am Ent Soc).

DICRANOPTYCHA O. S.

D. germana O. S. "New Jersey," (Am Ent Soc).

ANTOCHA O. S.

A. opalizans O. S. Dunnfield, Del. Water Gap, VII, 10.

ATARBA O. S.

A. picticornis O. S. Riverton, VI, 18.

TEUCHOLABIS O. S.

T. complexa O. S. Avalon: larvæ were found in considerable numbers on June 8, under bark; they commenced pupating in four or five days and on the 22d the imago appeared and continued to do so until the 27th.

RHYPHOLOPHUS Kol.

R. innocens O. S. Westville, IV, 9.

ERIOPTERA Meig.

E. chlorophylla O. S. Common, Westville, VII, 2, Riverton, VI, 19, VII, 3.

E. straminea O. S. Riverton, VI, 18.

E. venusta O. S. Woodbury, VI, 7.

E. septemtrionis O. S. Riverton, VII, 3.

E. armata O. S. "New Jersey" (Am Ent Soc, Bt).

E. chrysocoma O. S. Riverton, VI, 18, Westville, VII, 2.

E. caloptera Say. Westville, V, 19, VII, 21, Riverton, VII, 3, Avalon, VII, 22.

E. parva O. S. Orange, VI (O S), Del. Water Gap, VII, 13.

E. vespertina O. S. "New Jersey" (Am Ent Soc).

MOLOPHILUS Curtis.

M. forcipula O. S. South Orange (O S).

M. hirtipennis O. S. Orange (O S).

M. ursina O. S. "New Jersey" (Am Ent Soc).

M. pubipennis O. S. Shark River, VII, 12.

TRIMICRA O. S.

T. anomala O. S. Anglesea, V, 30, VII, 9 (Sm).

SYMPLECTA Meig.

S. punctipennis Meig. Shiloh, IX, 1, Riverton, IX, 25.

GNOPHOMYIA O. S.

G. tristissima O. S. Westville, VI, 6, Del. Water Gap, VII, 8.

GONIOMYIA Megerle.

G. manca O. S. South Orange, VI, 30, 1868 (O S).

G. blanda O. S. "New Jersey" (Am Ent Soc).

G. sulphurella O. S. Riverton, V, 28, Asbury Park, VIII, 16.

G. cognatella O. S. Clementon, V, 12.

EPIPHRAGMA O. S.

E. fascipennis Say. Riverton, V, 29, Clementon, VI, 3, Woodbury, VI, 7,
Newark, VI, 16.

LIMNOPHILA Macq.

L. fuscovaria O. S. Westville, VI, 6, Jamesburg, VII, 4, Clementon, VIII, 9.

L. luteipennis O. S. Woodbury, VI, 7, Westville, VII, 2, Lenola, V, 30.

L. tenuipes O. S. Riverton, VII, 24.

L. macrocera Say. Westville, VI, 6.

L. adusta O. S. "New Jersey" (Am Ent Soc), Westville, V, 18.

L. recondita O. S. Riverton, VII, 24.

L. rufibasis O. S. Dover, VI, 11.

L. imbecilla O. S. "New Jersey" (Am Ent Soc).

L. toxoneura O. S. "New Jersey" (Am Ent Soc).

ULOMORPHA O. S.

U. pilosella O. S. Shark River, VII, 12.

TRICHOCERA Meig.

T. maculipennis Meig. Caldwell, V, 5 (Cr), Westville, IV, 9.

ERIOCERA Macq.

E. fuliginosa O. S. Orange Mts., VII, 4.

E. spinosa O. S. Dunnfield, Del. Water Gap, VII, 14.

E. wilsoni O. S. "New Jersey" (Am Ent Soc).

PENTHOPTERA Schiner.

P. albitarsis O. S. Del. Water Gap, VII, 11, 12, Shark River, VII, 12,
Clementon, VIII, 7.

AMALOPIS Haliday.

A. inconstans O. S. Woodbury, V, 14, Westville, VI, 6, Shiloh, IX, 1, Del.
Water Gap, VII, 11.

PEDICIA Latr.

- P. albivitta* Wlk. Dunnfield, Del. Water Gap, VII, 11, 15, Caldwell (Cr),
Riverton, IX, 10 (Viereck).

LIOGMA O. S.

- L. nodicornis* O. S. "New Jersey" (Cr, Am Ent Soc).

PTYCHOPTERA Meig.

- P. rufocincta* O. S. Riverton, V, 30, Newark, VI, 16, Westville, VII, 12
(Jn), Clementon, VI, 7 (Li).

BITTACOMORPHA Westwood.

- B. clavipes* Fabr. Westville, V, 19, Atco, VI, 18, Riverton, X, 9 (Jn), Cald-
well (Cr), Lahaway, V, 28, Jamesburg, V, VI, along ditches (Sm).

LONGURIO Loew.

- L. testaceus* Loew. Dunnfield, Del. Water Gap, VII, 12, 15.

TIPULA Linn.

- T. abdominalis* Say. Morris Plains (Jn), Caldwell (Cr).
T. caloptera Loew. Del. Water Gap, VII, 15, Dover, VI, 17 (Jn), Ocean
County (Sm).
T. trivittata Say. Newark, VI, 13, Dunnfield, Del. Water Gap, VII, 11, 15.
T. bella Loew. Clementon, V, 10, Westville, VIII, 21, Riverton, IX, 11.
T. longiventris Loew. Newark, VI, 12, Dover, VI, 17.
T. fuliginosa Say. Newark, VI, 13, Dover, VI, 17.
T. hibes Loew. Westville, IX, 13 (Jn), Caldwell (Cr).
T. fasciata Loew. Clementon, V, 30, VIII, 11, Jamesburg, VII, 4, Palisades,
Del. Water Gap, VII, 11.
T. tricolor Fabr. Clementon, VIII, 11, Jamesburg, VII, 21, Westville, VIII-
8, Del. Water Gap, VII, 15.
T. costalis Say. Princeton, VII, 21, Riverton, IX, 9 (Jn), Caldwell (Cr).
T. cunctans Say. Riverton, IX, 25, X, 9.
T. speciosa Loew. Newark, VI, 13, Dover, VII, 17.
T. submaculata Loew. Del. Water Gap, VII, 15 (Jn), Caldwell (Cr).
T. valida Loew. Del. Water Gap, VII, 15, Dover, VI, 23.
T. dejecta Walk. Clementon, IV, 15.
T. tephrocephala Loew. Dunnfield, Del. Water Gap, VII, 8.
T. cincta Loew. Riverton, IV, 17.
T. strepens Loew. Riverton, V, 30, Newark, VI, 13.

- T. sp.* Clementon, V, 30.
T. sp. Shark River, VII, 12.
T. sp. Riverton, VII, 16, 30.

PACHYRRHINA Macq.

- P. ferruginea* Fabr. Common, Riverton, Shiloh, IX, 1, New Brunswick, Delaware Water Gap, VII, 11-15.
P. incurva Loew. Westville, VI, 6, Newark, VI, 14, New Brunswick, VII, 1.
P. collaris Say. Westville, IV, 9.
P. virescens Loew. Riverton, VI, 19, Delaware Water Gap, VII, 11, 15, Newark, VI, 14, Dover, VI, 23, Westville, VII, 21.
P. tenuis Loew. Newark, VI, 14, Westville, VI, 6, Del. Water Gap, VII, 10.
P. eucera Loew. Riverton, VII, 3.
P. unifasciata Loew. Dunnfield, Del. Water Gap, VII, 14.
P. sodalis Loew. "New Jersey," without data.
P. macrocera Say. New Jersey (Cress, Am Ent Soc).

DOLICHOPEZA Curtis.

- D. annulata* Say. Clementon, VI, 3, Dover, VI, 17, Del. Water Gap, VII, 21.

CTENOPHORA Meig.

- C. nubecula* O. S. Caldwell, V, 29 (Cr).
C. fumipennis O. S. Palisades, VI, 6 (Love).

XIPHURA Brullé.

- X. frontalis* O. S. Palisades, V (Love).

Family DIXIDÆ.

Small, slender mosquito-like species, wings bare, antennæ thick at base, other joints hair-like, joints indistinctly marked: larva aquatic. Our only species is not of economic importance.

DIXA Meigen.

- D. notata* Loew. Dunnfield, Del. Water Gap, VII, 11, 15.

Family BIBIONIDÆ.

Loose-jointed, ungainly flies of moderate size, with long, stout legs, body often clothed with long hair, antennæ many jointed, but short and stout, mouth parts a little produced. There is often considerable difference between the sexes, and in some cases the females have a ridiculously small head. From the very early appearance of some species they are called "March flies," and sometimes they occur in orchards in numbers so great as to attract attention.

The larvæ are cylindrical, footless grubs, and "feed on excremental or vegetable substances, especially on the roots of grass." They have not been, thus far, injurious in New Jersey.

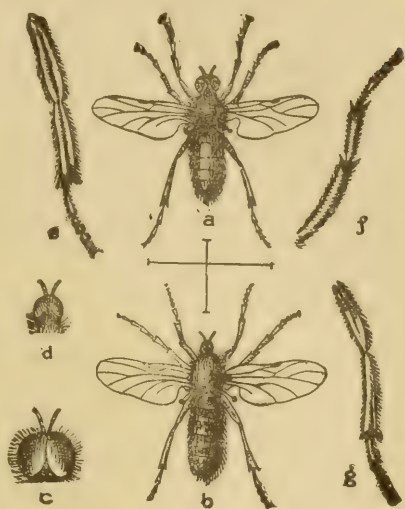


Fig. 296.—*Bibio albipennis*: *a*, male; *c*, its head; *b*, female; *d*, her head; all enlarged. Other references to structural details.

BIBIO Geoff.

B. albipennis Say. Westville, V, 19,

Clementon, V, 30 (Jn), Caldwell (Cr), Newark (Sm).

B. pallipes Say. Riverton, V, 1, Jamesburg, VII, 4.

B. femorata Wied. Riverton, V, 1 (Jn), Newark, V (Sm), Caldwell (Cr).

B. xanthopus Wied. Caldwell (Cr), Riverton, IV, 30.

B. longipes Loew. Palisades (Love).

DILOPHUS Meig.

D. breviceps Loew. Clementon, V, 9, VI, 16, Westville, V, 19.

D. dimidiatus Loew. Anglesea, V, 28 (W), V, 30 (Sm), Avalon, VI, 8.

PLECIA Wied.

P. heteroptera Say. Jamesburg (Sm), Caldwell (Cr).

SCATOPSE Geoffroy.

S. notata Linn. Clementon, V, 9.

S. pygmaea Loew. Riverton, VII, 31, IX, 9.

S. atrata Say. Riverton, IV, 23.

Family SIMULIDÆ.

Rather undersized chunky flies, known as "black flies," dark in color, the thorax well developed and somewhat produced forward so as to partially conceal the small head from above. Though the head is small in proportion to the insect, the mouth parts are exceedingly well developed and furnished with a formidable array of lancets for puncturing and bloodsucking. The wings are short and broad, the venation obscure except along the front margin.

These flies are horrible pests locally, not so much in our State as in some others west and north, the "buffalo gnat" of the Mississippi Valley region and "black fly" of the north woods being excellent examples.

In New Jersey some species are pests in the Orange Mountains and northward, getting into the ears of horses, or even occasionally of man.

The larvæ are aquatic and live in running water.

SIMULIUM Latr.

S. venustum Say. "Black fly," Orange Mts., Caldwell, VII (Cr), Clementon, V, 30, Delaware Water Gap, VII, 11.

S. invenustum Walk. Clementon, IV, 15 (Jn), Orange Mts. (Sm), Passaic (U S Dept Ag).

S. vittatum Zett. Orange Mts. (Sm).

S. meridionale Riley. Passaic (U S Ag).

Family RHYPHIDÆ.

These are known as "false crane flies," differing in the smaller size and broader, spotted wings. They often come into houses, and the larvæ live in water, rotten wood or excrementitious matter. They are of no economic importance.

RHYPHUS Latr.

R. alternatus Say. Morris Plains, VI, 25, Clementon, V, 30, Riverton, III, 20 (Jn), Caldwell (Cr).

R. punctatus Meig. Westville (Jn), Monmouth County (Sm), Camden, XII, 8 (Kp), Palisades (Love).

Family LEPTIDÆ.

Termed "snipe flies" by Prof. Comstock because of the general form of body in many species. The thorax is rather globular, the abdomen pointed, the head moderately large, antennæ short, mouth parts prolonged into a beak projecting

downward and backward, legs rather long and slender. Some of the species are densely hairy, with contrasting golden yellow and black or brown markings. They are predatory in habit, but rather sluggish in motion. The larvæ are also predatory, and live under widely-varying conditions.

XYLOPHAGUS Meigen.

- X. persequus* Walk. Caldwell (Cr).
X. lugens Loew. Riverton, IV, 17 (Jn), Caldwell (Cr), Woodbury, IV, 29 (Kp), Palisades, IV, under chestnut bark (Love).
X. abdominalis Loew. Riverton: the larvæ and pupæ were found beneath the bark of a dead pine, III, 20; imagos emerged, IV, 5 and 8.

XYLOMYIA Rond.

- X. pallipes* Say. Lahaway, VII, 6 (Sm).

DIALYSIS Walker.

- D. rufithorax* Say. Westville, VI, 6, Merchantville, VI, 28.
D. elongata Say. Jamesburg, VII, 4, Dunnfield, Del. Water Gap, VII, 8, 12.

CHRY SOPILA Macq.

- C. ornata* Say. Newark, VI, 16, Dover, VI, 18 (Jn), Palisades, V, 30 (Love).
C. thoracica Fabr. Newark, VI, 13, Dover, VI, 17 (Jn), Anglesea, VII, 25, Orange Mts. (Sm).
C. fasciata Say. Newark, VI, 15, Westville, VII, 2, Dunnfield, Del. Water Gap, VII, 8, 14.
C. quadrata Say. Dunnfield, Del. Water Gap, VII, 8, 15, Atco, VII, 12.
C. propinqua Walk. Mullica Hill, Clementon, V, 30, Anglesea, VII, 25.
C. basilaris Say. Westville, VIII, 18, Riverton, VII, 3.
C. rotundipennis Say. Buena Vista, VI (Li), Riverton, VI, 19, VII, 3.

LEPTIS Fabr.

- L. punctipennis* Say. Clementon, V, 30, Westville, VI, 6, Newark, VI, 16, Dover, VI, 17.
L. plumbea Say. New Brunswick (Sm).
L. mystacea Macq. Palisades, V, 24 (Love), Woodbury, IV, 30, Clementon, V, 30, Dover, VI, 18 (Jn), New Brunswick (Sm).
L. hirta Loew. Dunnfield, Del. Water Gap, VII, 15.
L. ochracea Loew. Dunnfield, Del. Water Gap, VII, 8, 12, 15.
L. scapularis Loew. "New Jersey" (Bt).

Family STRATIOMYIDÆ.

Known as "soldier flies" from their yellow bands and stripes. Usually they are somewhat depressed or even much flattened, especially the abdomen, over which the wings are laid flat and overlapping each other. The mouth parts are developed for lapping only, and the adults are always found among flowers. The antennæ vary in shape, and may be short or of quite moderate length; but always the third joint is compound and often has an arista.

The larvæ vary greatly in habit, from predatory to feeders upon excrement, living or dead vegetable matter, on land or in water: Some of them have been even found in salt or alkaline water.

None are of economic importance.

ALLOGNOSTA O. S.

- A. fuscitarsis* Say. Anglesea, V, 27, Newark, VI, 15 (Jn), Caldwell (Cr), New Brunswick (Sm).
A. obscuriventris Loew. Anglesea, V, 30 (W), Westville, VI, 15 (Jn), Ocean Co., V (Sm).

BERIS Latr.

- B. viridis* Say. Ocean Co., V, New Brunswick (Sm).

SARGUS Fabr.

- S. decorus* Say. Newark, VI, 14, Jamesburg, VII, 4 (Jn), Palisades (Love), Caldwell (Cr).
S. elegans Loew. Caldwell, (Cr).
S. viridis Say. Clementon, V, 30.
S. cæruleifrons Johns. Dunnfield, Del. Water Gap, VII, 12.
S. cuprarius Linn. Over fifty specimens of this European species were taken along Second River, near Newark, VI, 12-14, 1892: one specimen, Caldwell, VI, 10, 1892 (Cr).

PTECTICUS Loew.

- P. testaceus* Fabr. New Brunswick, VIII, 21 (Sm), Westville, VII, 2, Dunnfield, VII, 15, Riverton, VII, 16.
P. similis Will. Riverton, VII, 2, Dunnfield, Del. Water Gap, VII, 11.
P. sackenii Will. Dunnfield, Del. Water Gap, VII, 8, 11, Westville, VIII, 8, Riverton, VI, 20, VII, 3.

MICROCHRYSA Loew.

- M. polita* Linn. Merchantville, VII, 19, Newark, V (Jn), New Brunswick (Sm).

STRATIOMYIA Geoff.

- S. meigenii* Wied. Westville, VII, 5, VIII, 8, Anglesea, VII, 19.
S. norma Wied. Caldwell (Cr), Del. Water Gap, VII, 15.
S. discalis Loew. Westville, VI, 15, Clementon, V, 16 (Jn), Elizabeth, V, 17 (Kp), Cramer Hill, V, 23.

ODONTOMYIA Meig.

- O. cincta* Oliv. Anglesea, V, 30, VII, 25, Avalon, VI, 9, Cape May, VI, 14 (Jn), Palisades, VI, 7 (Love).
O. hieroglyphica Oliv. Morris Plains, VI, 25.
O. vertebrata Say. Westville, VI, 14, Anglesea, V, 30, VII, 19, Avalon, VI, 30.
O. virgo Wied. Westville, VII, 2-12, Merchantville, VI, 28.
O. microstoma Loew. Cape May, VI, 22, Anglesea, VII, 10-25, Atlantic City, VII, 15.
O. flavicornis Oliv. Caldwell (Cr), Southern New Jersey (Sm).
O. interrupta Oliv. Westville, IV, 26, Clementon, V, 10, 16, Sandy Hook.
O. pubescens Day. Sandy Hook.

OXYCERA Meigen.

- O. maculata* Oliv. Lenola, Clementon, V, 30, Merchantville, VI, 28.

NEMOTELUS Geoff.

- N. carbonarius* Loew. Avalon, VI, 8, Cape May, VI, 14, Anglesea, VII, 4.
N. crassus Loew. Lenola, V, 30.

PACHYGASTER Meigen.

- P. pulcher* Loew. Avalon, VII, 22.

Family TABANIDÆ.

These are moderate or large species popularly known as horse flies. They have short, broad heads, enormous eyes, and short, though many-jointed feelers. The abdomen is oval, a little flattened, and the body is convex and powerful. The mouth parts consist of a series of fine sharp-pointed lancets so rigid that they readily pierce the skin, lying in a soft, fleshy labella. They frequent woods or the edges of woodland, sometimes low meadows or marshy places, and occasionally prove serious pests to stock. They are often troublesome in wood roads because, with three or four black flies buzzing about, horses may be driven almost frantic. Similar species occur along the shore, where

they are known as "green heads." In some localities they are called "deer flies," and some have the name "golden-eyed" flies, because their eyes are banded or striped with metallic yellow or brown. The female only has the blood sucking habit, and the male lives on pollen and the like.

The larvæ are elongated, somewhat flattened creatures, living in water or in the soil of marshy land, preying upon whatever comes in their way.

Animals should be protected by netting when driven over infested roads, or should have an application of fish oil and carbolic acid at points not within easy reach of the tail.

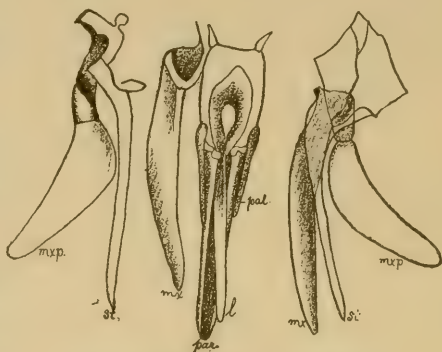


Fig. 297.—Mouth parts of a "horse-fly."

PANGONIA Latr.

P. pigra O. S. Dunnfield, Del. Water Gap, VII, 12, 14.

P. chrysocoma O. S. Dunnfield, Del. Water Gap, VII, 11.

CHRY SOPA Meigen.

C. celer O. S. Clementon, V, 12, 30, Westville, VI, 15, Dover, VI, 17.

C. niger Macq. Common, Clementon, V, 12, Atco, VI, 4, Newark, VI, 13, Dover, VI, 17, Jamesburg, VII, 4.

C. callidus O. S. Riverton, VI, 16, Newark, VI, 13, Dover, VI, 17, Jamesburg, VII, 4, Dunnfield, VII, 11.

C. pudicus O. S. Atco, VI, 18, Anglesea.

C. montanus O. S. Morris Plains, VI, 24, Merchantville, VI, 28, Clementon, VIII, 8.

C. flavidus Wied. Jamesburg, VII, 4, Anglesea, VII, 10, Avalon, VII, 22.

C. univittatus Macq. Atco, VI, 18, Morris Plains, VI, 21, Jamesburg, VII, 4.

C. moechus O. S. Glassboro, VIII, 1 (Greene), Riverton, VII, 3, Jamesburg, VII, 4, Anglesea, VII, 19, Dunnfield, VII, 11.

C. morosus O. S. Lakewood (Lansing).

C. vittatus Wied. Merchantville, VI, 28, Jamesburg, VII, 4, Clementon, VIII, 9.

C. striatus O. S. Riverton, VII, 3, Atlantic City, VIII, 7, Clementon, VIII, 8.

C. fallax O. S. Buena Vista, VI, 11, Morris Plains, VI, 25, Jamesburg, VII, 4, Dunnfield, VII, 11, Atco, VI, 18.

C. obsoletus Wied. Jamesburg, VII, 4, Avalon, VII, 22, Westville, VII, 26.

C. plangens Wied. Cape May, VI, 14, Atco, VI, 4, Avalon, VI, 8.

C. fugax O. S. Atco, VI, 4, Newark, VI, 13, Buena Vista, VI, 11.

C. indus O. S. Clementon, V, 10, 12.

HÆMATOPOTA Meig.

H. punctulata Macq. Jamesburg, VII, 4.

THERIOPLECTES Zeller.

T. cinctus Fabr. Lakewood (Lansing).

T. lasiophthalmus Macq. Anglesea, V, 30, Merchantville, VII, 19 (Kp),
Lahaway, VI, 1, VII, 30 (Sm), Caldwell (Cr).

T. trispilus Wied. Jamesburg, VII, 4, Plainfield, VII, 11 (Love), Westville,
VII, 5 (Jn), Glassboro, VII, 7 (Greene).

T. affinis Kirby. Cape May, VI, 14, Sea Isle City (Luccareni).

T. epistates O. S. Morris Plains, VI, 24 (Jn), Glassboro, VI, 18 (Greene).

T. politus Johns. Type taken in Merchantville, VI, 28, 1891.

TABANUS Linn.

T. catenatus O. S. Caldwell, VI, 15 (Cr), Merchantville, VI, 19 (Kp),
Atlantic County, VI, 24 (Sm), Lakewood (Lansing).

T. exul O. S. Caldwell (Cr), Merchantville, VII, 19 (Greene).

T. sulcifrons Macq. Dunnfield, Del. Water Gap, VII, 14, 15.

T. abdominalis Fabr. Elizabeth, VII, 30 (Kp), Caldwell (Cr).

T. molestus Say. Orange Mts. (Sm).

T. trimaculatus Say. Caldwell (Cr), Woodbury, VI, 4 (Kp), New Brunswick, VII (Sm).

T. melanocerus Wied. Lakewood (Lansing).

T. coffeatus Macq. Riverton, VII, 3, Shark River, VII, 9 (Jn), Caldwell (Cr).

T. orion O. S. Atco (Kp), Caldwell (Cr), Palisades (Love).

T. nivosa O. S. Type from New Jersey (Am Ent Soc).

T. longulus O. S. Dunnfield, Del. Water Gap, VII, 11, 15.

T. pumilus Macq. Riverton, VI, 19, Merchantville, VI, 28, Jamesburg, VII,
4 (Jn), Caldwell (Cr).

T. sparsus Whitney. Atco, VI, 18, Riverton, VII, 24.

T. lineola Fabr. Common; Westville, VI, 27, Shark River, VII, 11, Sea Isle City, VIII, 23, Dunnfield, Del. Water Gap, VII, 15.

T. nigrovittata Macq. The common "green-head" of the sea shore, Cape May, VI, 22, Anglesea, VII, 19, Sea Isle, VIII, 23.

T. costalis Wied. Westville, VII, 4, Shark River, VII, 9 (Jn), New Brunswick, VII (Sm).

T. fulvulus Wied. Lakewood (Lansing).

T. sagax O. S. Lakewood (Lansing).

T. nigrescens Pal. Beauv. Caldwell (Cr), Dunnfield, Del. Water Gap, VII,
8 15.

T. stygius Say. Riverton, VII, 14 (Jn), Merchantville, VII, 19 (Greene), Caldwell (Cr), New Brunswick, VII, 20 (Sm).

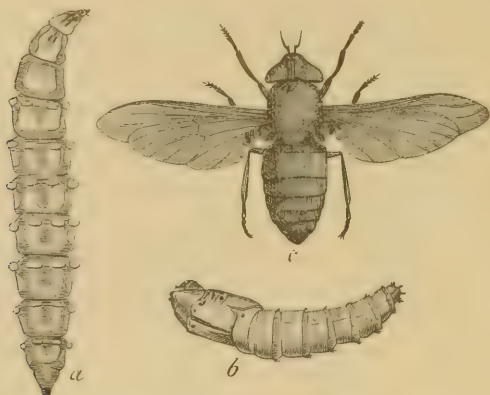


Fig. 298.—*Tabanus atratus*, black horse fly: *a*, larva; *b*, pupa; *c*, adult.

T. atratus Forst. Common, Newark, VI, 14, Anglesea, VII, 17, Clementon, VII, 26, Del. Water Gap, VII, 13 (Jn), New Brunswick, VI, 5, (Sm).

T. americanus Forst. Glassboro, VII, 1, VIII, 1 (Greene), Lakewood (Lansing), Atlantic City, VIII, Pt. Pleasant (Stone).

T. giganteus De Geer. Caldwell (Cr), Palisades (Love).

T. mexicanus Linn. Da Costa, VII, (Bland).

T. reinwardtii Wied. New Brunswick (Sm), Caldwell (Cr), Dunnfield, Del. Water Gap, VII, 11.

T. sodalis Will. Dunnfield, Del. Water Gap, VII, 11.

ATYLOTUS O. S.

A. bicolor Wied. Clementon, V, 30, Buena Vista, VI, 11, Orange Mts., VII, 4.

Family ASILIDÆ.

Head prominent, very hairy, with short, several jointed antennæ, and a short, stout proboscis formed for piercing. The body is robust, also hairy, the abdomen long, slender, cylindrical, tapering very gradually to the tip. The wings are long and narrow, the legs moderately long and very powerful, densely clothed with spines, while the tips of the tarsi are supplied with unusually long, stout claws. The insects are called "robber-flies" from their habit of pouncing upon, piercing and sucking the juices of other insects in mid-air while holding them in the grasp of their powerful legs. Some of the species are brightly colored, but most of them are of a sober gray with blackish

mottlings. These robber-flies, though predatory, can scarcely be considered of much real value to the farmer because they take anything that comes along, useful or otherwise, and are just as ready to destroy bees as some harmful species.

The larvæ are also carnivorous so far as known, and live in the ground or in decaying wood.

LEPTOGASTER Meigen.

- L. badius* Loew. Jamesburg, VII, 4, Dunnfield, Del. Water Gap, VII, 8, 15, Riverton, VII, 30.
L. flavipes Loew. Newark, VI, 16, Dunnfield, VII, 15.
L. testaceus Loew. Westville (Jn), Caldwell (Cr).
L. incisularis Loew. Riverton, VII, 30, Atco.
L. histrio Wied. Princeton, VII, 21.
L. pictipes Loew. Clementon, V, 30, Atco, VI, 4, 18, Dunnfield, VII, 12.

CERATURGUS Wied.

- C. aurulentus* Fabr. Westville, VIII, 21, 1892.
C. cruciatus Say. Dunnfield, Del. Water Gap, VII, 8, 11 (Jn), Caldwell (Cr), Dover, VII, 16.

DIOCTRIA Meigen

- D. albius* Walk. Newark, Dunnfield, Del. Water Gap, VII, 14, 15.

LAPHYSTIA Loew.

- L. sexfasciata* Say. Avalon, VII, 29, VIII, 2.

CYRTOPOGON Loew.

- C. chrysopogon* Loew. Clementon, V, 16.
C. marginalis Loew. Clementon, V, 10 (Greene).

DAULOPOGON Loew.

- D. opaculus* Loew. New Jersey (Coll Am Ent Soc).
D. terricola Johns. Clementon, V, 9, Wenonah, V, 14, Riverton, V, 29.

HOLCOCEPHALA Jænn.

- H. abdominalis* Say. Princeton, VII, 21, Dunnfield, VII, 9 (Jn), Cumberland Co., IX, 1 (Sm).
H. calva Loew. Princeton, VII, 21, Cumberland County, IX, 1.

HOLOPOGON Loew.

- H. guttulata* Wied. Clementon, V, 30, Newark, VI, 14, Jamesburg, VII, 4, Dunnfield, VII, 9.

STICHOPOGON Loew.

- S. argenteus* Say. Sandy Hook, VIII, Anglesea, VII, 22, Avalon, VII, 29, VIII, 2.
S. trifasciatus Say. Sandy Hook, Jamesburg, VII, 4 (Jn), Caldwell (Cr), Westville, VII, 12, Cumberland Co., IX (Jn), Lahaway IX, 26 (Sm).

DEROMYIA Philippi.

- D. discolor* Loew. Caldwell (Cr), Merchantville, VII, 19 (Kp).
D. umbrinus Loew. Dunnfield, Del. Water Gap, VII, 14.
D. winthemi Wied. Lakewood, Atco, VII, 12 (Jn), Atlantic Highlands, VII, 11 (Love), Morristown, VII, 18 (Jn), Glassboro, VIII, 1 (Greene).

TARACTICUS Loew.

- T. octopunctatus* Say. Dunnfield, Del. Water Gap, VII, 11 (Jn), Buena Vista, VII, 10 (Li).

NICOCLES Jænn.

- N. pictus* Say. Clementon, IV, 15.
N. politus Loew. Anglesea, IX, 4, Riverton, IX, 5, 11.

CEROTAINIA Schiner.

- C. macrocera* Say. Newark, VII, 14, Princeton, VII, 21.

ATOMOSIA Macq.

- A. puella* Wied. Merchantville, VI, 29, VII, 19 (Jn), Caldwell (Cr).

POGONOSOMA Rondani.

- P. melanoptera* Wied. Atlantic Co., XI, 24 (Sm).

HYPERECHIA Schiner.

- H. atrox* Will. New Brunswick, VIII, 28 (Sm).

LAMPRIA Macq.

- L. bicolor* Wied. Dunnfield, Del. Water Gap, VII, 15 (Jn), Caldwell (Cr).

LAPHRIA Meig.

- L. canis* Will. Clementon, V, 30 (Jn), Fort Lee, VI (Love), Newark, VI, 12, Dover, VI, 18, Merchantville, VI, 25.
L. sericea Will. Dunnfield, Del. Water Gap, VII, 8-15.

DASYLLIS Loew.

- D. flavicollis* Say. Newark, VI, 14, Atco, VI, 18, Morris Plains, VI, 17, 25, Jamesburg, VII, 4, Dunnfield, VII, 12.

- D. posticatus* Say. Westville, V, 17, Atco, VI, 4, 18, Jamesburg, VII, $\frac{3}{4}$ 4, Dunnfield, Del. Water Gap, VII, 11.
D. thoracica Fabr. Prospertown, VI, 7 (Sm), Atco, VI, 4, Newark, VI, 14, Morris Plains, VI, 25, Dunnfield, VII, 11.
D. grossa Fabr. Lakewood (Lansing), Glassboro (Greene), Jamesburg, VII, 4, Dunnfield, Del. Water Gap, VII, 11 (Jn), Caldwell (Cr).

MALLOSPHORA Macq.

- M. clansicella* Macq. Atco, VII, 9, DaCosta, VII, 30.

PROMACHUS Loew.

- P. bastardi* Macq. New Jersey (Coll Am Ent Soc).

ERAX Macq.

- E. æstuans* Linn. Shiloh, IX, 1, Caldwell (Cr), Glassboro (Greene), Chester (Dkn).
E. cinerascens Bellardi. Anglesea, VII, 9, VIII, 24, Jamesburg, VII, 4, Westville, VIII, 16.
E. bastardi Macq. Jamesburg, Orange Mts., VII, 4, Anglesea, VII, 12, Dunnfield, Del. Water Gap, VII, 14, Riverton, V, 29.



Fig. 299.—Bastard robber fly:
Erax bastardi and its
pupa.

PROCTACANTHUS Macq.

- P. philadelphicus* Macq. Riverton, VII, 31, VIII, 21, Westville, VIII, 28, IX, 13, Caldwell (Cr), Lahaway, IX, 26 (Sm).
P. brevipennis Wied. Anglesea, VI, 25, VII, 12, Atco, VII, 12 (Jn), Lahaway, VIII, 3 (Sm).
P. rufus Will. Merchantville, VI, 26, Jamesburg, VII, 4, Anglesea, VII, 16-19, Dunnfield, Del. Water Gap, VII, 12.

ASILUS Linn.



Fig. 300.



Fig. 301.



Fig. 302.

Fig. 300.—Silky robber fly, *Asilus sericeus*. Fig. 301.—Asilid larva. Fig. 302.—Missouri bee-killer: *Asilus missouriensis*.

- A. sericeus* Say. Atco, VI, 19, Merchantville, VI, 26, Orange Mts., VII, 4 (Jn), Caldwell (Cr).
A. flavipes Will. Riverton, V, 30, Newark, VI, 14, Dover, VI, 18, Lahaway, VIII, 5 (Sm).
A. novæ-scotiæ Macq. Orange Mts. (Jn), Caldwell (Cr).
A. annulatus Will. Anglesea, IX, 3 (Sm).

NEOITAMUS O. S.

- N. distinctus* Will. Dover, VI, 17, 23.

TOLMERUS Loew.

- T. notatus* Wied. Anglesea, V, 30, Newark, VI, 14, Dunnfield, Del. Water Gap, VII, 15, Shiloh, IX, 1.
T. annulipes Macq. Newark, VI, 14, Dover, VI, 18, Morris Plains, VI, 24.

OMMATIUS Illiger.

- O. tibialis* Say. Morris Plains, VI, 24, Westville, VII, 5, Avalon, VII, 23, Dunnfield, Del. Water Gap, VII, 15, Shiloh, IX, 1.

Family MYDAIDÆ.

The "midas flies," resemble the preceding in form and are, like them, predatory. They are much larger, however, with contrasting black and orange colors, the antennæ being long and clubbed at tip. They are practically unimportant.

MYDAS Fabr.

- M. clavatus* Drury. Riverton, VII, 3, Anglesea, VII, 4, 19, Da Costa, VII, 30 (Jn), Fort Lee (Bt), Caldwell (Cr).
M. chrysostomus Fabr. Anglesea, VII, 19, Avalon, VII, 18, 22.
M. fulvifrons Illiger. Avalon, VII, 29, 1894.

Family BOMBYLIIDÆ.

These are the "bee-flies" which derive their common name from the fact that they are more or less covered with dense, diverging whitish or yellow hair, giving them a close resemblance to certain bees. Many occur, hovering over bare places in early spring, others are found on flowers, often poised in midair between or over them. One series resembles the bumble-bees and has a long pointed proboscis; the other is more slender, the abdomen tending to become flattened with a short proboscis and much less contrasting colors.

The larvæ are parasitic or partly predatory. Some are true parasites in lepidopterous larvæ; others feed on the egg-pods of grass-hoppers, while yet others feed in nests of bees, destroying first the bee egg or larva and then feeding upon the food stored for it.

They are never harmful to growing vegetation, hence may be classed as, on the whole, beneficial.

EXOPROSOPA Macq.

E. fascipennis Say. Palisades, VII, 26 (Love), Westville, VIII, 14-23 (Jn), Lakewood, VIII (Lansing), Caldwell (Cr).

E. emarginata Macq. Lakewood, VIII (Lansing).

E. fasciata Macq. Westville, VIII, 23, IX, 10 (Jn), Caldwell (Cr), Lakewood (Lansing).

SPOGOSTYLUM Macq.

S. analis Say. Sea Isle City, VII, 22, Clementon, VIII, 9 (Jn), Lakewood, VIII (Lansing), Atco, IX, 1 (Kp), Del. Water Gap, VII, 10, Sandy Hook, Anglesea, IX, 4 (Jn).

S. albofasciata Macq. Buena Vista, VI, 11, Atco, VII, 9, Clementon, VIII, 9, Westville, VIII, 21.

S. pauper Loew. Del. Water Gap, VII, 10, Westville, VIII, 14-23, Clementon, VIII, 9 (Jn), Atco, IX, 1 (Kp).

S. limatula Say. Riverton, IX, 5.

S. argyropyga Wied. Riverton, VII, 4, Dunnfield, Del. Water Gap, VII, 11, 15.

S. cedipus Fabr. Westville, V, 18, VI, 27, VIII, 21, 23 (Jn), Caldwell (Cr), Chester (Dkn), Lahaway, VII, 1, Del. Water Gap, VII, 12 (Jn).

S. simson Fabr. Westville, VIII, 23, Clementon, VIII, 7, Atco, VII, 9 (Jn), Caldwell (Cr), Sandy Hook (Bt).

ANTHRAX Scop.

A. lateralis Say. Del. Water Gap, VII, 11, Jamesburg, VII, 4, Clementon, VIII, 9, Anglesea, VIII, 15, Westville, VIII, 23.

A. alternata Say. Westville, VI, 15, VIII, 23, Jamesburg, VII, 4 (Jn), Caldwell (Cr), Sandy Hook (Sm).

A. hypomelas Macq. Chester (Dkn), Orange Mts., VII, 4, Shiloh, IX, 1, Westville, IX, 10.

A. fulvohirta Wied. Riverton, VII, 2, Westville, VIII, 14-28, Clementon, VII, 26 (Jn), Caldwell (Cr).

A. tegminipennis Say. Sandy Hook, VIII (Bt).

A. ceryx Loew. Clementon, VIII, 6-11 (Jn), Lakewood (Lansing), Atco, IX, 8 (Greene).

A. sinuosa Wied. Buena Vista, VI, 11, Jamesburg, VII, 4, Da Costa, VII, 30, Riverton, VI, VII (Jn), Caldwell (Cr).

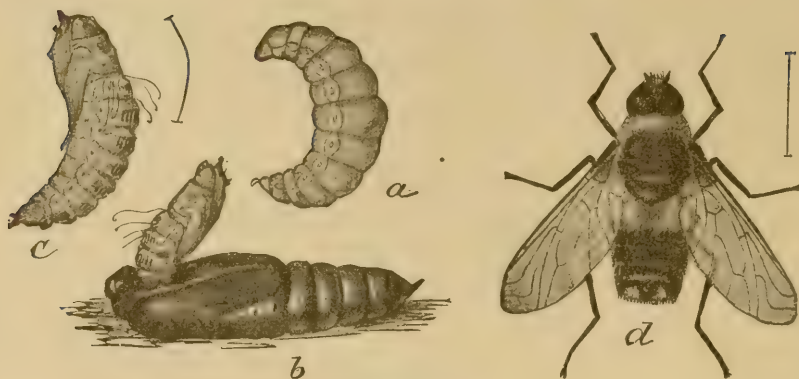


Fig. 303.

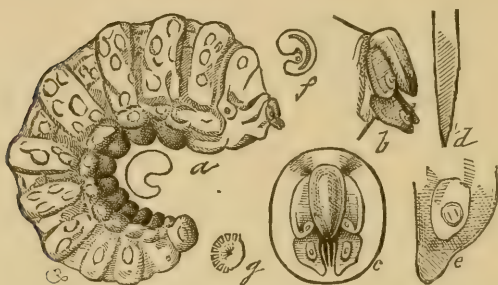


Fig. 305.



Fig. 304.

Fig. 303.—*Anthrax hippomelas*: a, larva; b, fly pupa projecting from cut-worm pupa; c, pupa; d, adult: all enlarged.

Fig. 304.—Bee-fly, *Systachus oreas*, parasitic on grasshopper egg-pods, pupa and adult.

Fig. 305.—Larva of *Systachus oreas* enlarged and details of structure.

ONCODOCERA Macq.

- O. leucoprocta* Wied. Clementon, V, 30, Atco, VI, 18 (Jn), Toms River (Edwards).

BOMBYLIUS Linn.

- B. major* Linn. Westville, IV, 9, Clementon, IV, 15, Newark V (Jn), Palisades, IV, 8 (Love).
B. pygmæus Fabr. South Amboy, V, 5 (Kp), Jamesburg, V, 4, Orange Mts. (Sm), Caldwell (Cr).
B. puchellus Loew. Westville, V, 6, Jamesburg, V (Jn), So. Amboy, V, 5 (Kp).
B. lancifer Loew. Atco, VI, 18, Morris Plains, VI, 25, Orange Mt., VII, 4.
B. atriceps Loew. Clementon, V, 10, 30 (Jn), Caldwell (Cr).
B. varius Fabr. Westville, VI, 15, VII, 2, Riverton, VI, 17, VII, 3 (Jn), Buena Vista, VI, 8 (Li).
B. philadelphicus Macq. Clementon, V, 30, Atco, VI, 13, 18, Jamesburg, VII, 4 (Jn), Albion, VI, 1 (Calvert).

SYSTÆCHUS Loew.

- S. vulgaris* Loew. Da Costa, VII, 19, Clementon, VIII, 7-9, Lakewood, Burlington Co. (Sm).

SPARNOPOLIUS Loew.

- S. fulvus* Wied. Chester (Dkn), Westville, Aug. 28, Riverton IX, 11 (Jn), Atco, IX, 11 (Nell).

PHTHIRIA Meig.

- P. sulphurea* Loew. Lakewood, Atco, VI, 13, 18, Riverton, IX, 5, 11.
P. n. sp. Jamesburg, VII, 4.

GERON Meig.

- G. senilis* Fabr. Jamesburg, VII, 4, Atco, VII, 12, Clementon, VIII, 7.
G. subauratus Loew. Westville, VI, 27, Dunnfield, VII, 8.
G. calva Loew. Dunnfield, Del. Water Gap, VII, 11-12.
G. capax Coq. Riverton, IV, 30, 1899.

SYSTROPUS Wied.

- S. macer* Loew. Lakewood (Lansing), Clementon, VIII, 9 (Jn), Atco, IX, 1 (Kp), Caldwell (Cr).

LEPIDOPHORA Westwood.

- L. ægeriiformis* Westw. Caldwell (Cr).

TOXOPHORA Meigen.

T. amphitea Walk. Buena Vista, VI, 11, Atco, VI, 18, DaCosta, VII, 30.

Family THEREVIDÆ.

Called "stiletto flies" by Comstock, because of their slender, pointed abdomen. They resemble the robber flies, but have longer legs and are more slightly built. They are also predatory, but the lips are broad and fleshy and they are not nearly so active as the asilidæ.

The larvæ are long and slender, the segments constricted so that they seem doubled in number, and they live in mold, fungi, rotten wood and vegetable decay generally, feeding sometimes upon the material among which they are found, sometimes upon such other insects as come in their way.

They can scarcely be said to be beneficial, for the prey of the adults does not consist of insects that are harmful to the farmer, so far as I am aware.

PSILOCEPHALA Zett.

P. hæmorrhoidalis Macq. Avalon, VI, 9, Cape May, VI, 14, Newark, VI, 16, Jamesburg, VII, 4, Westville, VIII, 13, Shiloh, IX, 1.

P. marmorata Coq. Cape May, VI, 14, Avalon, VI, 8.

P. aldrichi Coq. Jamesburg VII, 4, Westville, VII, 12.

P. rufiventris Loew. Clementon, V, 30, Pleasantville, VI, 13 (Lt), Westville, VII, 2, Anglesea, VII, 16, Atlantic City, VIII, Avalon, VI, 9.

P. scutellaris Lowe. Jamesburg, VII, 4, Dunnfield, Del. Water Gap, VII, 8, 12.

P. pictipennis Wied. Riverton, VII, 3, Jamesburg, VII, 4, Atco, VI, 18, VII, 9.

THEREVA Latr.

T. flavicincta Loew. Caldwell (Cr), Dunnfield, Del. Water Gap, VII, 15.

T. otiosa Coq. Riverton V, 14.

TABUDA Walker.

T. fulvipes Walker. Lahaway, IV, 20 (Sm), Clementon, IV, 15, Westville, IV, 16, Riverton, IV, 17, 30.

Family SCENOPINIDÆ.

The "window-flies": small, slight, blue flies, somewhat flattened, and with yellow or red legs. The larvæ are slender and worm-like, often found under carpets, where they feed on "moths" and other carpet pests.

SCENOPINUS Latr.

S. fenestralis Linn. Glassboro, VII, 5 (Greene), Riverton, Atco, VII, 21 (Jn), Caldwell (Cr), New Brunswick (Sm).



Fig. 396.—The window-fly, *Scenopinus fenestralis*: enlarged.

Family ACROCERIDÆ.

Called "small-headed flies" because of the unusually small head compared with the large hump-backed thorax and inflated abdomen. They are rare, the larvæ are parasitic upon spiders or their egg sacs and are of no economic importance.

ONCODES Latr.

O. costatus Loew. "New Jersey," no data.
O. pallidipennis Loew. Anglesea, VI, 20 (Sm).
O. incultus O. S. Collingwood, VI, 11.

Family LONCHOPTERIDÆ.

The "spear-winged" flies, characterized by the pointed wings that induced the common name. They occur near water courses, and little is known of them or their habits: only two species have been collected in New Jersey.

LONCHOPTERA Meig.

L. lutea Panz. Westville, VII, 4, Anglesea, VII, 19 (Jn), New Brunswick, VII, 20 (Sm).
L. riparia Meig. Ocean Co., V (Sm).

Family EMPIDÆ.

The "dance-flies," so called because of their habit of congregating in swarms under trees or near shrubs and about brooks, dancing up and down. The mouth parts are often prolonged into a beak, and they are predatory in habit. The larvæ are predatory, and live under leaves and other decaying vegetable matter where their prey occurs.

EUHYBUS Coquillett.

- E. triplex* Walk. Clementon, V, 22, Mullica Hill, Westville, V, 30, Anglesea, V, 28, Atlantic City, V, 15.
E. subjectus Walk. Clementon, V, 30, Jamesburg, VII, 4, Atco, VII, 12, Avalon, VII, 22, Riverton, IX, 9.

SYNECHES Walk.

- S. thoracicus* Say. Merchantville, VI, 28, Jamesburg, VII, 4, Atco, VII, 12.
S. simplex Walk. Atco, VI, 18, Westville, VII, 2, Avalon, VII, 22, Clementon, VIII, 6.
S. rufus Loew. Atco, VII, 9, Avalon, VI, 30 (Jn), Buena Vista, VII, 10 (Li).
S. hyalinus Coq. Westville, VII, 21, Avalon, VII, 22.
S. pusilla Loew. Jamesburg, VII, 4.

EMPIS Linn.

- E. spectabilis* Loew. Caldwell (Cr), Wenonah, V, 14, Clementon, IV, 15, Riverton, V, 1.
E. longipes Loew. "New Jersey" (O S).
E. brachystoma Coq. ms. Newark, VI, 13.
E. loripedis Coq. Clementon, V, 9 (Jn), Palisades, V, 24 (Love).
E. tridentata Coq. Woodbury, VI, 7.

RHAMPHOMYIA Meigen.

- R. longicauda* Loew. Dunnfield, Del. Water Gap, VII, 12.
R. tersa Coq. Prospertown, VI, 1 (Sm).
R. priapululus Loew. Clementon, V, 9.
R. gracilis Loew. Dunnfield, Del. Water Gap, VII, 11.
R. glabra Loew. Newark, VI, 16 (Jn), Caldwell (Cr).
R. compta Coq. Clementon, VI, 16.
R. basilaris Loew. Clementon, V, 9.
R. nana Loew. Clementon, V, 10, Del. Water Gap, VII, 10.
R. pulla Loew. Clementon, V, 30 (Jn), Atco, VI, 3 (Li).
R. angustipennis Loew. Clementon, V, 9, 30.
R. vittata Loew. Clementon, V, 30.

- R. luteiventris* Loew. Morris Plains, VI, 24, Clementon, VI, 3.
R. minytus Walk. Dover, VI, 17.
R. limbata Loew. Clementon, V, 9, 10.
R. candicans Loew. Clementon, V, 30, Avalon, VI, 9, Morris Plains, VI, 24.
R. manca Coq. Clementon, V, 9, Riverton, VI, 19, VII, 3.
R. pulchra Loew. Westville, VI, 6 (Ju), Lahaway, VII, 12 (Sm).
R. pusio Loew. Riverton, V, 1.
R. polita Loew. Riverton, V, 29.
R. vara Loew. Newark V (Sm).
R. leucoptera Loew. Riverton, IV, 11, 30.
R. scolopacea Say. Dunnfield, Del. Water Gap, VII, 15.
R. clauda Coq. Clementon, V, 10.
R. diversa Coq. Clementon, V, 9, 10.
R. macilenta Loew. Lahaway, VII, 5 (Sm), Dunnfield, Del. Water Gap, VII, 11.

HILARA Meigen.

- H. testacea* Loew. Clementon, V, 9.
H. lutea Loew. Clementon, V, 10, 30.
H. leucoptera Loew. Avalon, VI, 9.
H. mutabilis Loew. Clementon, V, 9, 10, Avalon, VI, 9.
H. femorata Loew. Avalon, VI, 8.
H. tristis Loew. Dover, VI, 17.
H. umbrosa Loew. Clementon, VI, 2.
H. gracilis Loew. Dunnfield, Del. Water Gap, VII, 12.
H. seriata Loew? Clementon, V, 26.

GLOMA Meigen.

- G. n. sp.* Clementon, V, 30.

PLATYPALPUS Macq.

- P. æqualis* Loew. Merchantville, VI, 28, Clementon, VI, 16, Dunnfield, VII, 14.
P. mesogramma Loew. Westville, VII, 21, Merchantville, VI, 28, Dunnfield, Del. Water Gap, VII, 8, 15.
P. pachynema Loew. Clementon, V, 9, 16, Westville, VI, 6.

TACHYDROMIA Meig.

- T. pusilla* Loew. Clementon, V, 9, Riverton, V, 1.

HEMERODROMIA Meig.

- H. empiformis* Say. Dunnfield, Del. Water Gap, VII, 11.
H. deflecta Loew. Avalon, VI, 9.

NEOPLASTA Coquillett.

N. scapularis Loew. Clementon, V, 16, 30.

LEPTOPEZA Macq.

L. flavipes Meig. Dover VI, 18.

L. compta Coq. Riverton, VI, 20

OEDALEA Meig.

O. stigmatella Zett. ? Newark, VI, 13.

CHIROMANTIS Rond.

C. vocatoria Fall. Del. Water Gap, VII, 12.

Family DOLICHOPODIDÆ.

Small, usually shining green, sometimes black or yellow flies, with short antennæ, plump body and comparatively long legs, which are often contrasting yellow or brown. The tarsi or feet are unusually long, whence they are called "long-footed flies," and in the male the anterior pair are often curiously flattened or otherwise modified. In the same sex the abdomen is often furnished with curiously complex claspers, which are bent down beneath the body. In the female there is usually a pointed, flat ovipositor. They are predatory in habit, feeding chiefly upon smaller flies. The larvæ are long, slender cylindrical and feed on decaying vegetation.

DOLICHOPUS Latr.

D. johnsoni Aldr. Type taken at Jamesburg, VII, 4, 1891.

D. gratus Loew. Palisades (O S), Dunnfield, Del. Water Gap, VII, 8.

D. calcaratus Aldr. Type taken at Dover, VI, 18, '92, Dunnfield, Del. Water Gap, VII, 8.

D. setifer Loew. Clementon, V, 16, Westville, V, 19, Riverton, IX, 9.

D. acuminata Loew. Westville, V, 19, Clementon, V, 30.

D. albicoxa Aldr. Clementon, V, 30, Anglesea, V, 28 (Jn), Burlington and Ocean Cos., V (Sm).

D. palæstricus Loew. Dover, VI, 18.

D. tonsus Loew. Clementon, V, 30.

D. variabilis Loew. Westville, VIII, 14, Dunnfield, Del. Water Gap, VII, 14.

D. cuprinus Wied. Dover, VI, 16, Merchantville, VI, 28, Jamesburg, VII, 4.

D. longipennis Loew. Merchantville, VI, 28, Dunnfield, Del. Water Gap, VII, 11.

- D. cornutus* Loew. Newark, VI, 16, Westville, V, 19, VII, 5, Anglesea, V, 25, Avalon, VII, 22, Riverton, IX, 11.
D. lobatus Loew. Dunnfield, Del. Water Gap, VII, 15.
D. scoparius Loew. Dover, VI, 23.
D. quadrilamellatus Loew. Palisades, VI, (O S).
D. funditor Loew. Merchantville, VI, 28.
D. incisuralis Loew. Merchantville, VI, 28.
D. albiciliatus Loew. Dover, VI, 23.
D. bifractus Loew. Jamesburg, VII, 4, Ocean Co. (Sm), Westville, VIII, 18.
D. eudactylus Loew. Woodbury, VI, 7, Riverton, VII, 3.
D. vittatus Loew. Princeton, VII, 21.
D. batillifer Loew. New Jersey (Bt).

GYMNOPTERNUS Loew.

- G. flavus* Loew. Westville, VII, 21, Dunnfield, Del. Water Gap, VII, 8-12, Dover, VII, 16.
G. spectabilis Loew. Westville, V, 19, Clementon, V, 30.
G. scotias Loew. Shark River, VII, 12.
G. ventralis Loew. Shark River, VII, 12.
G. debilis Loew. Merchantville, VI, 28, Jamesburg, VII, 4.
G. barbatulus Loew. Westville, VI, 18.
G. exilis Loew. Merchantville, VI, 28, Avalon, VI, 30.
G. lunifer Loew. Ocean Co., V (Sm).
G. subdilatus Loew. Del. Water Gap, VII, 8.

PELASTONEURUS Loew.

- P. vagans* Loew. Princeton, VII, 21, Clementon, V, 30.
P. lugubris Loew. Cape May, VI, 22.

TACHYTRECHUS Stannius.

- T. vorax* Loew. Westville, VIII, 18.
T. n. sp. Clementon, V, 10.

LASIARGYRA Mik.

- L. albicans* Loew. Princeton, VII, 21.

ARGYRA Macq.

- A. calcitrans* Loew. Clementon, V, 30, VI, 3, Westville, VI, 6.
A. minuta Loew. Dunnfield, Del. Water Gap, VII, 15.

HERCOSTOMUS Loew.

- H. n. sp.* Clementon, V, 30.

NEMATOPROTUS Loew.

N. sp. nov. Westville.

PORPHYROPS Meig.

P. fumipennis Loew? Woodbury, V, 14.

P. melampus Loew. Westville, V, 19, Lenola, V, 30.

P. nigricoxa Loew. Lenola, V, 30.

LEUCOSTOLA Loew.

L. cingulata Loew. Woodbury, VI, 7, Shark River, VII, 12, Dunnfield, Del. Water Gap, VII, 15.

DIAPHORUS Meig.

D. mundus Loew. Avalon, VII, 22, 29.

D. sodalis Loew. Westville, VI, 6.

D. leucostomus Loew. Anglesea, V, 28 (Sm), Shark River, VII, 12, Riverton, IX, 11.

D. opacus Loew. Jamesburg, VII, 4, Buena Vista, VI, 11.

THINOPHILUS Wahlb.

T. neglecta Wheeler. Cape May, VI, 6.

ASYNDETUS Loew.

A. ammophilus Loew. Westville, VIII, 19, Riverton, VII, 30.

A. syntormoides Wheeler. The type was taken at Avalon, VIII, 22, '94.

CHRYSOTUS Meigen.

C. obliquus Loew. Jamesburg, Ocean Co., V, Anglesea, V, 28 (Sm).

LIANCALUS Loew.

L. genualis Loew. "New Jersey" (Bt).

HYDROPHORUS Fallen.

H. pirata Loew. New Jersey (Bt).

NOTHOSYMPYCNUM Wheeler.

N. fortunatus Wheeler. Dunnfield, Del. Water Gap, VII, 11, 13.

N. n. sp. Riverton, X, 9.

SYMPYCNUM Loew.

S. lineatus Loew. Avalon, VI, 30, Princeton, VII, 21.

S. sp. nov. Riverton, V, 20.

NEURIGONA Rond.

N. floridula Wheeler. Type taken at Dover, VI, 23, '92, Dunnfield, Del. Water Gap, VII, 15, Riverton, VI, 20.

N. sp. Riverton, VII, 3.

SAUCROPUS Loew.

S. superbiens Loew. Riverton, VII, 3, IX, 11.

S. rubellus Loew. "New Jersey" (Bt).

MEDETERUS Fischer.

M. princeps Wheeler. Types were collected at Farmingdale, VII, 14, '97.

M. nigripes Loew. "New Jersey" (Crn, Am Ent Soc).

M. aberrans Wheeler. Avalon, VII, 22 (Wheeler).

APTORTHUS Aldrich.

A. albiciliatus Aldr. Types collected at Westville, VII, 5, 20, 1891.

A. townsendii Aldr. Atlantic City, VIII, 11, '95.

GRAMPTOPSILOPUS Aldrich.

G. bicolor Loew. Common, Riverton, VII, 3, Jamesburg, VII, 4, Atco, VII, 9, Dunnfield, Del. Water Gap, VII, 11, Clementon, VIII, 8.

G. tenera Loew. Dunnfield, Del. Water Gap, VII, 15.

G. scintillans Loew. Avalon, VI, 30, VII, 29, Princeton, VII, 21.

G. psittacinus Loew. Avalon, VI, 30 (Jn), Anglesea, VII, 4 (Love).

G. variegatus Loew. Cape May, VI, 22, Avalon, VI, 30.

PSILOPUS Meigen.

P. inermis Loew. Buena Vista, VI, 11, Avalon, VI, 30, Shark River, VII, 12, Atlantic City, VIII, 11.

P. caudatulus Loew. Merchantville, VI, 28, Cape May, VI, 14.

P. scobinator Loew. Atco, VII, 9, Clementon, VIII, 6, Westville, V, 5.

P. scaber Loew. Caldwell (Cr), Shark River, VII, 12.

P. patibulatus Say. Jamesburg, VII, 4, Anglesea, VII, 19, Westville, VII, 26.

P. sipho Say. Merchantville, VI, 28, Mullica Hill, V, 30, Caldwell (Cr).

P. pallens Wied. "New Jersey" (Bt).

Family SYRPHIDÆ.

These are "flower-flies," usually brightly colored and banded with yellow on a black, bronze or blue ground. They have very short, aristate or stylate three-jointed feelers, barrel-shaped bodies, and somewhat flattened abdomen, varying from slender to broadly oval. Sometimes they are almost bare and resemble wasps in appearance and habits; at others they are hairy and resemble bees even in the droning or buzzing noise that they make. The mouth parts are formed for scraping and lapping only, and they feed upon honey or pollen.

In larval habits they vary greatly. Some are predatory and feed upon plant lice; these are usually wrinkled, pointed anteriorly, and they live among their prey upon leaves of plants. Others feed in plant tissue, being more or less maggot or grub-like; and yet others are scavengers, the larvæ feeding in the foulest excrementitious matter: these are usually furnished with a long breathing tube from the anal end, and are known as rat-tailed larvæ. Some few species seem to feed upon pollen, and at least one form occurs between the leaf and stalk of corn, feeding upon the juices. Yet, on the whole, the species are beneficial.



Fig. 307.—A "rat-tailed" larva.

MICRODON Meig.

- M. fuscipennis* Macq. Westville, VII, 2.
M. globosus Fabr. Westville, VII, 2, IX, 10, Anglesea, IX, 4.
M. megalogaster Snow. Clementon, V, 30.
M. tristis Loew. Clementon, V, 9, 30, Newark, VI, 14, Dover, VI, 17.

CHRYSTOXUM Meigen.

- C. laterale* Loew. Westville, IX, 10.
C. pubescens Loew. New Brunswick (Sm), Woodbury, IV, 2 (Jn), Atco, IX, 19 (Greene).
C. ventricosum Loew. Newark, VI, 27.

PIPIZA Fall.

- P. modesta* Loew. Atco, VII, 9, Clementon, V, 30.
P. pistica Will. Clementon, V, 30, Newark, VI, 14, Riverton, VIII, 14.
P. pulchella Will. Sandy Hook, VIII, 11.
P. calcarata Loew. Dunnfield, Del. Water Gap, VII, 12, Riverton, VII, 4.
P. sp. Avalon, VI, 9.

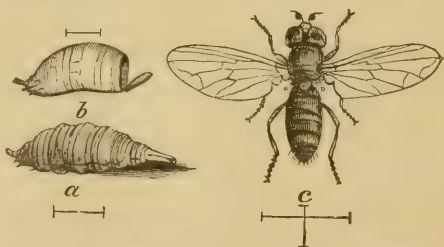


Fig. 308.—*Pipiza radicans*: a root-louse Syrphid: a, larva; b, pupa; c, adult: all enlarged.

PARAGUS Latr.

- P. angustifrons* Loew. Westville, VI, 15, Atco, VII, 12, Anglesea, VII, 19, Jamesburg, VII, 15.
P. bicolor Fabr. Princeton, VII, 21.
P. tibialis Fall. Atco, VI, 4, Dover, VI, 23, Jamesburg, VII, 4, Clementon, VIII, 6.

CHRYSOGASTER Meig.

- C. nigripes* Loew. New Brunswick (Sm), Westville, VI, 15, Morris Plains, VI, 25, Riverton, V, 10, Orange (Loew).
C. nitida Wied. Westville, V, 19, Jamesburg, VII, 15, Anglesea, VII, 19.
C. pictipennis Loew. Clementon, V, 9, Lenola, V, 30.
C. pulchella Will. Jamesburg, VII.



Fig. 309. — *Syrphus* larva eating a plant-louse.

CHILOSIA Meig.

- C. pallipes* Loew. Dunnfield, Del. Water Gap, VII, 11, 15.
C. capillata Loew. Clementon, V, 9.

MELANOSTOMA Schiner.

- M. obscurum* Say. Westville, VI, 15, IX, 10 (Jn), Caldwell (Cr).
M. mellinum Linn. Westville, V, 19, Jamesburg, VII, 4 (Jn), Caldwell (Cr), New Brunswick (Sm).

PYROPHÆNA Schr.

- P. sp.* Del. Water Gap, VII, 15.

PLATYCHIRUS St. Farg. & Serv.

- P. quadratus* Say. Westville, V, 19, VIII, 23, Jamesburg, VII, 4, 15 (Jn), Palisades, VII, 10 (Love).
P. hyperboreus Stager. Jamesburg, VII, 4 (Jn), Caldwell (Cr), Elizabeth, V, 6 (Kp).

SYRPHUS Fabr.

- S. arcuatus* Fall. Westville, IV, 16, Camden, IX, 14 (Kp), New Brunswick, V, 3 (Sm).
S. ribesii Linn. Westville, VIII, 14, Newark, VI, 14, Cumberland Co., IX, 1.
S. torvus O. S. Caldwell (Cr), Camden, V, 26 (Greene), Westville, IX, 13 (Jn), Prospertown: common in Monmouth and Burlington Cos., feeding on the wheat-louse: the species of this genus are usually feeders upon plant-lice (Sm).
S. lesueurii Macq. Anglesea, V, 31 (Boerner), New Brunswick, VII, 9, Prospertown, VI, 6 (Sm), Atco, VI, 13, Dunnfield, Del. Water Gap, VII, 14.



Fig. 310.

Fig. 310.—*Syrphus torvus* : much enlarged.

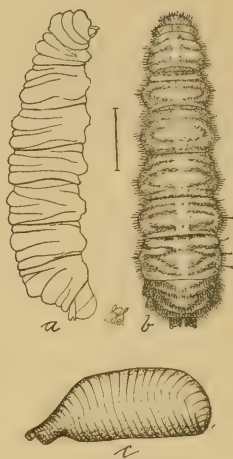


Fig. 311.

Fig. 311.—Larva *a* and *b*, and pupa *c*, of *Syrphus torvus* : much enlarged.

S. americanus Wied. Westville, VI, 26, IX, 13, Merchantville, VI, 28 (Jn),
New Brunswick, VI, 1, 16, Del. Water Gap, VII, 12 (Sm).

S. umbellatarum O. S. Riverton, VII, 30.

DIDEA Macq.

D. fuscipes Loew. Clementon, V, 16, Ocean Co., V, 18, Jamesburg, West-
ville, VIII, 21.

XANTHOGRAMMA Schiner.

X. emarginata Say. Westville.

X. flavipes Loew. Newark, VI, 16, Morris Plains, VI, 25.

X. æqualis Loew. Clementon, V, 9 (Viereck).

ALLOGRAPTA O. S.

A. obliqua Say. Caldwell (Cr), Atlantic Highlands, VII, 11 (Love), West-
ville, VI, 27, Atlantic City, VII, 15, Riverton, IX, 5.

MESOGRAMMA Loew.

M. politum Say. Gloucester, VIII, 14, Sandy Hook, VIII, 17, Riverton, IX,
5 (Jn), Caldwell (Cr) : this species is sometimes a corn pollen feeder in
the larval stage, and occurred in large numbers in the summer of 1899
between the leaves and stalk of corn in Atlantic county.

M. marginatum Say. Common throughout the State, VI to X.

- M. geminatum* Say. Westville, VI, 27, Clementon, VIII, 9, Riverton, IX, 5.
M. boscii Macq. Avalon, VII, 22.

SPHÆROPHORIA St. Farg. & Serv.

- S. cylindridrica* Say. Common throughout the State, VI to IX.

NEOASCIA Will.

- N. globosa* Walk. Westville, V, 19, Buena Vista, VI, 11, Princeton, VII, 21.

SPHEGINA Meig.

- S. keeniana* Will. Clementon, V, 16, VI, 7.
S. lobata Loew. Dunnfield, Del. Water Gap, VII, 8, 15, Riverton, VI, 19.
S. rufiventris Loew. Caldwell (Cr).

BACCHA Fabr.

- B. tarchetius* Walk. Westville, VIII, 28.
B. clavata Fabr. Riverton, IX, 11, Avalon, VI, 9.
B. lugens Loew. Atco, VII, 12.
B. aurinota Harris. Cumberland Co., IX, 1, Ocean Co. (Sm).
B. cognata Loew. Dunnfield, Del. Water Gap, VII, 11, 1899.

OCYPTAMUS Macq.

- O. fuscipennis* Say. Westville, VII, 4, VIII, 14, Clementon, VIII, 9 (Jn), Lakewood (Lansing).

RHINGIA Scopoli.

- R. nasica* Say. Westville, VIII, 28, Newark, VI, 16, Dover, VI, 18, Cumberland Co., IX, 1.

VOLUCELLA Geoff.

- V. evecta* Walk. Clementon, V, 30, Orange Mts., VI, 13, Dunnfield, Del. Water Gap, VII, 12.
V. vesiculosa Fabr. Riverton, V, 29, Dunnfield, Del. Water Gap, VII, 8.
V. fasciata Macq. Bred from Cactus (*Opuntia*), obtained at Clementon; flies continued to emerge from V, 31 to V, 16 (Kp), Anglesea, VII, 10, Lahaway, VII, 17 (Sm), Avalon, VI, 8: this insect is found wherever the prickly pear occurs, and there is no outward indication of its presence save that it is always associated with the larva of the Phycitid *Melitara prodenialis*.

SERICOMYIA Meig.

- S. chrysotoxoides* Macq. Ft. Lee (Edwards), Clementon, V, 9, Newark, VI, 16 (Jn), Blackwood, X, 10 (Viereck).

ERISTALIS Latr.

- E. tenax* Linn. Common, Clementon, V, 16, Westville, VII, 26, Morris Plains (Jn), Palisades, VII, 26 (Love) : this is the "drone" or "chrysanthemum fly" which occurs throughout the State. It is said to pollinize chrysanthemums, and to be the only insect engaged in this laudable occupation. It also resembles a honey bee so closely that most persons decline to handle it. Therefore it is called "drone-fly." Its larva lives in the foulest excrement, and is a typical rat-tailed maggot.
- E. æneus* Fabr. Common, Clementon, V, 10, Cape May, VI, 14, Jamesburg (Jn), New Brunswick (Sm), Orange.
- E. dimidiatus* Wied. Clementon, V, 10, Westville, VII, 5, Orange Mts. (Jn), Caldwell (Cr).
- E. saxorum* Wied. Caldwell (Cr), Clementon, V, 10, Jamesburg, VII, 4, Anglesea, VII, 19, Westville, VII, 26.
- E. meigenii* Wied. Common, Westville, VII, 5 (Jn), Snake Hill, IV, 26 (Love).
- E. bastardi* Macq. Westville, VII, 9, Anglesea, VII, 19, Shark River, VII, 12 (Jn), Newark (Sm), Snake Hill, IV, 26 (Love).
- E. flavipes* Walk. Sandy Hook, VII, 6 (Bt), Clementon, V, 16, Anglesea, VII, 19, Westville, IX, 13.
- E. transversus* Wied. Common, Westville, VII, 5, IX, 10, Clementon, V, 10, Orange Mts., VII, 4.

HELOPHILUS Meig.

- H. latifrons* Loew. Westville, IX, 13 (Jn), Burlington Co. (Sm), Caldwell (Cr).
- H. similis* Macq. Newark, V (Sm), Westville, IX, 9, Jamesburg, V, 19, Sandy Hook.
- H. lætus* Loew. Westville, V, 19, VIII, 16.
- H. chrysostomus* Wied. Westville, VII, 2 (Jn), Prospertown, VI, 7 (Sm), Caldwell (Cr).
- H. distinctus* Will. Westville, V, 19, Jamesburg, VII, 4.
- H. conostomus* Will. Cramer Hill, V, 30 (Greene), Westville, VII, 2.
- H. divisus* Loew. Westville, V, 14.
- H. integer* Loew. Newark, VI, 16, Westville, VI, 15, VII, 21 (Jn), New Brunswick, VI, 5 (Sm).
- H. hamatus* Loew. Elizabeth, V, 15 (Kp), Newark, V (Sm).
- H. flavifacies* Bigot? Dunnfield, Del. Water Gap, VII, 11.

PTERALLASTES Loew.

- P. thoracicus* Loew. Gloucester Co. (Sm).

TEUCHOCMEMIS O. S.

- T. bacuntius* Walk. Palisades (Love).

MALLOTA Meigen.

- M. posticatus* Fabr. Caldwell (Cr), Clementon, V, 16, Morris Plains, VI, 25 (Jn), New Brunswick, VII, 1 (Sm).
M. cimbiciformis Fall. Clementon, V, 9, 16, Riverton, VII, 3.



TRIODONTA Macq.

- T. curvipes* Wied. Cape May, VI, 14, An- Fig. 312.—*Mallota posticata* and its larva, glesea, IX, 20 (Jn), Elizabeth, V, 17, enlarged.
 21 (Kp).

TROPIDIA Meig.

- T. quadrata* Say. Common; Caldwell (Cr), Clementon, V, 10, Westville, VII, 2, VIII, 23.
T. calcarata Will. Westville, V, 19, Woodbury, VI, 7.
T. albistylum Macq. Gloucester Co., VII, 15 (Sm).

CRIORHINA Hoffm.

- C. umbratilis* Will. Clementon, V, 9, 16, South Amboy, V, 10 (Jn), Merchantville, V (Kp).
C. analis Macq. Clementon, V, 16, Newark, VI, 14, 16.
C. intersistens Walk. "New Jersey" (Walk).
C. vebosa Harris. Bergen Co., IV, 28 (Kp).

SOMULA Macq.

- S. decora* Macq. Clementon, V, 16, Newark, VI, 14 (Jn), Caldwell (Cr).

BRACHYPALPUS Macq.

- B. frontosus* Loew. Atco, IV, 2 (Kp), Newark, V (Sm), Sandy Hook, Riverton, V, 1.
B. rileyi Will. Westville, IV, 9, Clementon, IV, 15.
B. sorosis Will. Clementon, V, 14, 16.

XYLOTA Meigen.

- X. pigra* Fabr. Clementon, V, 10, Anglesea, VI, 19, Shark River, VII, 1.
X. bicolor Loew. Clementon, V, 30 (Greene), Englewood (O. S.).
X. ejuncida Say. Clementon, V, 16, Morris Plains, VI, 23, Orange Mts., VII, 4 (Jn), Palisades, VI, 28 (Love).
X. angustiventris Loew. Morris Plains, VI, 25, Dunnfield, Del. Water Gap, VII, 15.
X. anthreas Walk. Merchantville, VI, 28, Jamesburg, VII, 4.

X. analis Will. Clementon, VI, 3, Palisades, VI, 7 (Love).

X. chalybea Wied. Caldwell (Cr), Clementon, V, 14 (Greene).

SYRITTA St. Farg. & Serv.

S. pipiens Linn. Common throughout the State, May to Sept.

CHRYSOCHLAMYS Rond.

C. dives O. S. Westville, VI, 15.

SPILOMYIA Meig.

S. longicornis Loew. Anglesea, IX, 3 (Sm), VII, 19, Riverton, IX, 5, Westville, IX, 13.

S. fusca Loew. Dunnfield, Del. Water Gap, VII, 14.

S. hamifera Loew. Clementon, V, 30 (Greene), Caldwell (Cr), New Brunswick, VI, 5 (Sm).

MILESIA Latr.

M. ornata Fabr. Dunnfield, Del. Water Gap, VII, 11, 15, Clementon, VIII, 9, Cumberland Co., IX, 1 (Jn), New Brunswick, VIII, 8 (Sm).

SPHECOMYIA Latr.

S. vittata Wied. Riverton, V, 1, Clementon, V, 9, 16 (Jn), Caldwell (Cr).

CERIA Fabr.

C. abbreviata Loew. Clementon, V, 16.

Family CONOPIDÆ.

Medium-sized flies with a large head, comparatively small, chunky body, and a long abdomen, which is often constricted at base and enlarged bulb-like at tip, as in certain wasps. They are called "thick-head" flies, and have rather slender antennæ, though long for this series. The larvæ are parasites upon bees and grasshoppers.

CONOPS Linn.

C. brachyrhynchus Macq. Merchantville, VI, 29, Atco, VII, 12, Del. Water Gap, VII, 11, 14.

C. bulbrostris Loew. Atco, VII, 12 (Jn), Westville, V, 31 (Greene).

C. sylvosus Will. Atco, VII, 12 (Jn), Caldwell (Cr).

C. xanthopareus Will. Ocean Co. (Sm), Clementon, V, 30, Westville, VIII, 16, Jamesburg, VII, 4.

C. excisus Wied. Da Costa, VII, 30, Riverton, VII, 3.

PHYSOCEPHALA Schiner.

- P. tibialis* Say. Dunnfield, Del. Water Gap, VII, 8, Westville, VII, 5, Riverton, VI, 20, VII, 30 (Jn), Orange Mts. (Sm).
P. sagittarius Say. Common, Anglesea, VII, 15, Clementon, VIII, 6, Riverton, IX, 11, Orange Mts. (Jn), Ft. Lee (Bt).
P. furcillatus Will. Dunnfield, Del. Water Gap, VII, 14.

STYLOGASTER Macq.

- S. neglecta* Will. Dunnfield, Del. Water Gap, VII, 11, Riverton, VII, 15, 30.
S. stylatus Fabr. New Jersey (Bt).

ZODION Latr.

- Z. fulvifrons* Say. Prospertown, VI, 7 (Sm), Clementon, V, 10, Morris Plains, VI, 25, Westville, IX, 10.
Z. nanellum Loew. Buena Vista, VI, 11, Atco, VII, 12.

DALMANIA Desv.

- D. nigriceps* Loew. Clementon, V, 16, 30, Buena Vista, VI, 11.

MYOPA Fabr.

- M. vesiculosa* Say. Lenola, IV, 29, Camden, V, 18 (Kp), Newark, V (Sm), Buena Vista, VI, 11, Jamesburg, VII, 4.
M. vicaria Walk. Riverton, IV, 17 (Viereck).

ONCOMYIA Loew.

- O. abbreviata* Loew. Atco, VI, 4, Woodbury, VI, 7, Merchantville, VI, 28.

Family PIPUNCULIDÆ.

The "big eyed" flies of Comstock, so called because of their relatively enormous head, which is made up of eyes almost entirely. The species are rare, and little is known of the larvæ save that they are parasitic on bugs.

PIPUNCULUS Latr.

- P. albofasciatus* Hough. Westville, VII, 2.
P. similis Hough. Westville, VIII, 13.
P. atlanticus Hough. Clementon, V, 17, Riverton, VI, 18.
P. houghi Johns. Dunnfield, Del. Water Gap, VII.
P. subviridis Loew. Riverton, VI, 11, VII, 30.
P. nigripes Loew. Buena Vista, VI, 10.

CHALARUS Wlk.

C. spurius Fall. Delaware Water Gap, VII, 12.

Family PLATYPEZIDÆ.

Termed "flat-footed" flies because in the males the posterior tarsi are broad and much flattened. They are smaller than but resemble a house-fly, and occur in swarms near water courses, though locally. The larvæ live in mushroom, and are not of economic importance.

PLATYPEZA Meigen.

P. velutina Loew. Dunnfield, Del. Water Gap, VII, 11, Riverton, VII, 30.

CALLOMYIA Meigen.

C. tenera Loew. Westville, VII, 2, 21, Riverton, VII, 23 (Jn), "New Jersey," IV (Am Ent Soc).

Family ESTRIDÆ.

These are the "bot-flies," usually of good size, sometimes very large, and peculiar by having the mouth parts almost entirely aborted. Some are hairy, yellow, with rather a pointed abdomen—others are very plump, blue black, with a white bloom and very formidable in appearance. The larvæ live in the nasal passages, in the stomach or beneath the skin of the animals infested by them and often cause serious functional disturbance in the animals affected. They also lessen the value of the skins. The ordinary bots attacking horses and cattle lay their eggs on the hair of the animals, where they are likely to be licked off and so brought into the mucus-lined passages: hence it is a good plan, where bots are numerous, to keep horses cleaned and brushed and to prevent their licking themselves. Bots beneath the skin should be treated with mercurial ointment, and after a day or two squeezed out through a sufficient incision. Where they infest the stomach, or get into the nasal passages, a veterinarian must be consulted.

GASTROPHILUS Leach.

G. equi Fabr. Caldwell (Cr): the horse bot-fly, which spends the larval stage in the intestines, and is passed naturally when full grown: it pupates under ground and the eggs are laid on the hair.

G. nasal Linn. Caldwell (Cr).

HYPODERMA Clark.

H. lineata Villers. The "Ox Warble" : Hamilton (U S Ag).

H. bovis De Geer. Atlantic City, Belvidere (U S Ag).

These species live under the skin and form tumors and ulcers.

CESTRUS Linn.

O. ovis Linn. The sheep-bot; recorded from New Jersey. This species lives in the nasal and other head passages of sheep, and causes a disease known as blind staggers, often resulting in death.

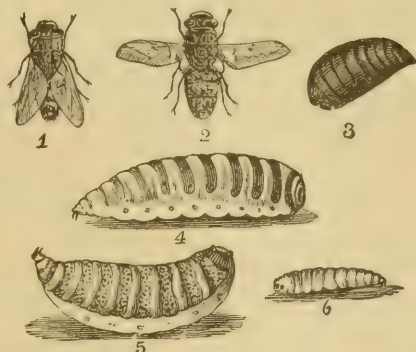


Fig. 313.—The sheep-bot, *Cestrus ovis*: 1, 2, flies, wings closed and open; 3, pupa; 4, 5, full-grown larvæ; 6, young larva.

CUTEREBRA Clark.

C. buccata Fabr. Ocean Co., June (Sm), Dunnfield, Del. Water Gap, VII, 12. Also a species living under the skin.

Family TACHINIDÆ.

The Tachina flies are almost all parasitic and of the very highest usefulness, since they form the chief control of many injurious caterpillars. They resemble house-flies, flesh-flies, and blue-bottles in appearance, but are much more bristly, sometimes formidable looking from the array of sharp points projecting in every direction. The bristle on the third antennal joint is always bare, and this is the best character for the recognition of the family.

These flies lay their eggs on the outside of the caterpillar, usually just back of the head, where the larva cannot easily get at them. They are white in color and quite large enough to be easily seen.



Fig. 314.—Tachinid parasite on cut worms showing larva, pupa and adult, as well as the eggs on the anterior segments of a caterpillar.

Cut-worms are a common prey of these flies:—sometimes of hundreds of such larvæ gathered not two per cent. will be free of these white eggs. In an army worm year sometimes scarcely one per cent. of the last brood is free. Anywhere from one to 100 grubs may infest a single caterpillar, depending upon the size of the host.

CISTOGASTER Latr.

C. immaculata Macq. Common, Westville, VI, 26, VII, 2-25, IX, 10, Atco, VII, 12 (Jn), Middlesex Co., VII, 7, Jamesburg, VII, 4 (Sm).

GYMNOSOMA Meig.

G. fuliginosa Desv. Common, Woodbury, VI, 7, Buena Vista, VI, 11, Anglesea, VII, 19, Clementon, VIII, 8 (Jn), Caldwell (Cr).

PHORANTHA Rond.

P. occidentalis Walk. Common, Clementon, V, 10, Westville, V, 19, Woodbury, VI, 7, Buena Vista, VI, 11, Atco, VII, 9.

ALOPHORA Desv.

A. æneoventris Will. Clementon, V, 16.

A. fumosa Coq. Clementon, V, 16, Dunnfield, Del. Water Gap, VII, 11, 12.

A. subopaca Coq. The type was taken at Woodbury, VI, 7, 1896, Riverton, IX, 11.

TRICHOPODA Latr.

T. plumipes Fabr. Glassboro, VII, 10, VIII, 2 (Greene), Caldwell (Cr), DaCosta, VII, 17 (Lt).

T. cilipes Wied. Westville, V, 31, VI, 15, Orange Mts., VII, 4 (Jn), Caldwell (Cr).

T. formosa Wied. Orange Mts., VII, 4.

T. pennipes Fabr. Common, Merchantville, VI, 23, Anglesea, VII, 19, DaCosta, VII, 30, Shark River, VII, 12, Cramer Hill, VIII, 24, Dunnfield, Del. Water Gap, VII, 8 : a parasite of the squash bug, *Anasa tristis*.

MYIOPHASIA Br. and Berg.

M. ænea Wied. Cape May, VI, 22, Atlantic City, VII, 15, Avalon, VII, 22 : a parasite of *Balaninus nasicus*, *Conotrachelus juglandis* and *Sphenophorus parvulus*, all of which are injurious weevils.

CRYPTOMEIGENIA Br. and Berg.

C. theutis Walk. Caldwell (Cr), Riverton, III, 20 (Jn), New Brunswick, V (Sm) : a parasite of *Lachnosterna inversa*.

CERATOMYIELLA Town.

C. conica Town. Westville, VII, 2.

ADMONTIA Br. and Berg.

A. demylus Walk. Atlantic Co., VIII : parasite of the pine saw-fly, *Lophyrus abbotii*.

A. degeerioides Coq. New Brunswick (Sm).

A. pergandei Coq. "New Jersey" (Am Ent Soc).

ACTIA Desv.

A. pilipennis Fallen. Dunnfield, Del. Water Gap, VII, 15.

CHÆTOPHLEPS Coquillett.

C. nebulosa Coq. Riverton, V, 14, 1899.

CELATORIA Coquillett.

C. spinosa Coq. Dunnfield, Del. Water Gap, VII, 12.

HYPOSTENA Meig.

H. dunningii Coq. Woodbury, V, 14, VI, 7.

H. tortricis Coq. Avalon, VII, 22.

H. variabilis Coq. Dunnfield, Del. Water Gap, VII, 8, 15: a parasite of
Pyrausta penitalis.

H. gilvipes Coq. Shiloh, IX, 1.

H. floridensis Town. Riverton, IX, 11.

H. flaveola Coq. Asbury Park, VIII, 16.

MACQUARTIA Desv.

M. pristis Walk. Dunnfield, Del. Water Gap, VII, 8, 15 (Jn), New Brunswick, VII, 18 (Sm).

HYPOCHÆTA Br. and Berg.

H. longicornis Schiner. Dunnfield, Del. Water Gap, VII, 15.

LESKIA Desv.

L. thecata Coq. Riverton, VII, 3.

L. analis Say. Anglesea, V, 28 (W), Clementon, VIII, 6, Westville, VIII, 14 (Jn), Collingswood (Greene).

LESKIOMIMA Br. and Berg.

L. tenera Wied. Woodbury, V, 15, Dunnfield, Del. Water Gap, VII, 9, Riverton, VII, 31.

LEUCOSTOMA Meig.

L. subopaca Coq. The type was taken at Clementon, V, 30, 1895.

L. senilis Town. Woodbury, VI, 7, Westville, VIII, 13.

SCIASMA Coq.

S. nebulosa Coq. Jamesburg, VII, 4.

CESTROPHASIA Br. and Berg.

Ce. ochracea Bigot. Lahaway, VII, 5 (Sm).

Ce. clausa B. & B. Clementon, VI, 7 (Li).

Ce. signifera V. d. Wulp. Atco, VI, 3 (Jn), Clementon, VI, 7 (Li).

HEMYDA Desv.

H. aurata Desv. Woodbury, VI, 7 (Greene).

EPIGRIMYIA Town.

E. polita Town. Woodbury, VI, 7.

E. floridensis Town. Westville, VII, 4.

SIPHONA Meig.

S. geniculata DeGeer. Lenola, V, 30, Avalon, VI, 30, Ocean Co., V, Shark River, VII, 12, Del. Water Gap, VII, 8.

PARAPLAGIA Br. and Berg.

P. spinosula Bigot. Atco, VI, 6 (Jn), Atlantic Co., VII, 24 (Sm).

CYRTOPHLÆBA Rond.

C. horrida Coq. Westville, IV, 19.

PLAGIA Meig.

P. americana V. d. W. Riverton, VII, 31.

SIPHOPLAGIA Town.

S. rigidirostris V. d. W. Westville, VIII, 13.

DISTICHONA V. d. W.

D. varia V. d. W. Atco, VII, 12.

PACHYOPHTHALMUS Br. and Berg.

P. signatus Meig. Jamesburg, VII, 4: a parasite of *Pelopæus cementarius*.

P. floridensis Town. Clementon, V, 16, Cape May, VI, 6, Woodbury, VI, 7, Atco, VI, 18; also a parasite of *Pelopæus cementarius*.

SENOTAINIA Macq.

S. rubriventris Macq. Common, Buena Vista, VI, 11, Atco, VII, 12, Atlantic City, VII, 15, Riverton, IX, 5.

S. trilineata V. d. W. Common; Atco, VI, 6, Farmingdale, VII, 14, Avalon, VII, 29, Clementon, VIII, 8: a parasite of *Sphecius speciosus*.

BELVOSIA Desv.

B. unifasciata Desv. Chester (Dkn), Clementon, VI, 3, Westville, VIII, 23: a parasite of the army worm (*Leucania unipuncta*).

B. bifasciata Fabr. Westville, VII, 26, Palisades, VII, 13 (Love), Clementon, VIII, 6 (Jn), Lakewood (Lansing): bred from *Eacles imperialis* and also infests *Cithronia regalis* and *Dryocampa rubicunda*.

Fig. 315.—*Belvosia unifasciata*.

Fig. 316.

Belvosia bifasciata.

APHRIA Desv.

A. ocypterata Town. Buena Vista, VI, 11, Atco, VII, 12, Westville, VII, 21, Da Costa, VII, 30.

OCYPTERA Latr.

O. carolinæ Desv. Common, Cape May, VI, 14, Westville, VI, 26, Atco, VI, 18, Atlantic City, VII, 15 (Jn), Caldwell (Cr): parasite of the army worm, *Leucania unipunctata*.

O. argentea Town. Westville, VII, 2, Orange Mts., VII, 4.

O. dosiades Walk. Dover, VI, 25, Westville, VI, 26, Atco, VII, 12, Atlantic City, VII, 15, Anglesea, VII, 19.

LINNÆMYIA Desv.

L. compta Fall. Westville, VI, 27, VII, 21, Farmingdale, VII, 14, New Brunswick, VIII, 11: a parasite of *Agrotis ypsilon*.

PANZERIA Desv.

P. radicum Fabr. Clementon, V, 9: a parasite of *Hyphantria cunea*.

MACROMEIGENIA Br. and Berg.

M. chrysoprocta Wied. Lakewood (Lansing).

GYMNOCHÆTA Desv.

G. alcedo Loew. Newark, VI, 16, Jamesburg, VII, 4, Woodbury, VI, 7 (Green).

EXORISTOIDES Coq.

E. slossonæ Coq. Westville, V, 30, Clementon, VII, 21.

EXORISTA Meig.

E. blanda O. S. Farmingdale, VII, 14, Dunnfield, Del. Water Gap, VII, 14: parasitic on *Euclea cippus*, *Nisoniades brizo* and *Pyrameis cardui* (Coq).

- E. boarmiae* Coq. Atlantic Co., VII: bred from the oak tortrix, *Cacœcia fervidana* (Sm).
- E. helvina* Coq. Anglesea, VII, 11, New Brunswick, Jamesburg, Dunnfield, Del. Water Gap, VII, 14.
- E. confinis* Fall. Riverton, III, 3, Woodbury, V, 14, Farmingdale, VII, 14, Orange Mts., VII, 4, Dunnfield, Del. Water Gap, VII, 12: a parasite of *Lycaena pseudargiolus* and *Thecla calanus*.
- E. futilis* O. S. Westville, V, 19: a parasite of *Hadena apamiformis* and *Pyrameis atalanta*.
- E. griseocomicans* V. d. W. New Brunswick, VIII, 14 (Sm): a parasite of *Orgyia leucostigma*.
- E. eudryæ* Town. Clementon, VII, 26: a parasite of *Acronycta hamamelis*, *Agrotis ypsilon*, *Eudryas unio*, *Hyperchiria io*, and *Pyrameis atalanta*.

EUPHOROCERA Town.

- E. claripennis* Macq. Camden, III, 20, Westville, IV, 19, VII, 21, Clementon, VIII, 8, Farmingdale, VII, 14 (Jn), New Brunswick, VIII, 14 (Sm), Caldwell (Cr), Palisades, VI, 6 (Love): a parasite of *Anisota senatoria*, *Clisiocampa disstria*, *Empretia stimulea*, *Orgyia leucostigma*, *Vanessa antiopa* and other Lepidoptera, also of *Epilachna borealis*.

PHOROCERA Desv.

- P. rufilabris* V. d. W. Newark, VI, Jamesburg, VII, 4.
- P. comstocki* Will. Dover, VI, 18.
- P. doryphoræ* Riley. Parasite on potato beetle.



Fig. 317 — *Phorocera doryphoræ*: enlarged.

PROSPHERYSA V. d. W.

- P. æmulans* V. d. W. Anglesea.

TACHINA Meigen.

- T. robusta* Town. Clementon, V, 10, 16 (Jn), Prospertown, VI, 1 (Sm): a parasite of *Agrotis ypsilon*.
- T. mella* Walk. Westville, IV, 19, VII, 21, Riverton, IV, 16 (Jn), Newark, V (Sm), Lakewood (Lansing): a parasite of *Orgyia leucostigma*, *Pyr-rharcia isabella*, *Leucarcia acraea*, etc.

BLEPHARIBEZA Macq.

- B. leucophrys* Wied. Dunnfield, Del. Water Gap, VII, 15.

WINTHEMIA Desv.

W. quadripustulata Fabr. Common, Riverton, V, 14, Westville, VII, 21, Clementon, VIII, 11, Cumberland Co., IX, 1 (Jn), New Brunswick, VIII, 7 (Sm): parasitic on *Attacus cecropia*, *Telea polyphemus*, *Orgyia leucostigma*, *Leucania unipuncta*, *Halisidota tessellata*, *Protoparce celeus*, etc.

Fig. 318.—*Winthemia 4-pustulata*.

PARADIDYMA Br. and Berg.

P. singularis Town. Atco, VII, 9, Riverton, VII, 3, IX, 25 (Jn), Buena Vista, VII, 10 (Li).

METACHÆTA Coq.

M. helymus Walk. Riverton, IV, 17, Clementon, V, 16, Buena Vista, VI, 11, Angelsea, VII, 19, Westville, VII, 21, Shark River, VII, 12.

PHORICHÆTA Rond.

P. sequax Will. Atco, VI, 4.

FRONTINA Meig.

F. ancilla Walk. Dunnfield, Del. Water Gap, VII, 15.

F. frenchii Will. New Brunswick: bred from *Telea polyphemus*, IV, 10 (Sm): bred, III, 17, from *Attacus cecropia* by G. Valentine, of Hammononton; also parasitic on *Anisota senatoria*, *Clisiocampa americana*, *Orgyia leucostigma*, *Papilio turnus*, etc.

STURMIA Desv.

S. albifrons Walk. Burlington Co., VII (Sm), Riverton, IX, 5: a parasite of *Ecpantheria scribonia* and *Leucartia acraea*.

S. inquinata V. d. W. Newark: bred from *Eacles imperialis* (Sm): also a parasite of *Protoparce celeus*, *P. carolina*, *Deilephila lineata*, etc.

MASICERA Macq.

M. tenthredinidarum Town. Woodbury, VI, 7, Jamesburg, VII, 4.

M. celer Coq. Westville, VI, 27, Dunnfield, Del. Water Gap, VII, 8, 14.

M. eufitchiæ Town. New Brunswick (Sm): a parasite of *Eufitchia ribearia* and *Hyphantria cunea*.

PSEUDOCHÆTA Coq.

P. argentifrons Coq. Merchantville, VI, 28.

CHÆTOPLAGIA Coq.

C. atripennis Coq. The type was taken at Westville, VII, 2, 1892; Riverton, VI, 18.

ARABA Desv.

A. tergata Coq. Shiloh, Cumberland Co., IX, 1, Riverton, VI, 16.

OPSIDIA Coq.

O. goniodes Coq. The type was taken at Atlantic City, VII, 15, '94; Shark River, VII, 12.

HILARELLA Rond.

H. decens Town. Jamesburg, VII, 15 (Sm).

H. fulvicornis Coq. Avalon, VI, 29, Atlantic City, VIII, 28, Del. Water Gap, VII, 13.

H. polita Town. Westville, V, 19, Woodbury, VI, 7.

H. siphonina Zett. Clementon.

BRACHYCOMA Rond.

B. intermedia Town. Anglesea, VII, 16, Westville, VII, 21.

B. sarcophagina Town. Shiloh, IX, 1.

GONIA Meig.

G. senilis Will. Buena Vista, VI, 6 (Li), Clementon, V, 12, Atco, VII, 12.

G. capitata DeGeer. Common, Caldwell (Cr), Westville, IV, 9, 19, Clementon, IV, 15, Buena Vista, VI, 11: a parasite of *Hadena devastatrix*, *Peridroma saucia*, etc.

SPALLANZANIA Desv.

S. hesperidarum Will. Anglesea, VI, 25, Westville, VI, 27, VII, 2, Atco, IX, 11: a parasite of *Eudamus tityrus*.

MICROPTHALMA Macq.

M. disjuncta Wied. Atco, VII, 12, IX, 8, Dunnfield, Del. Water Gap, VII, 15, Riverton, IX, 11: a parasite of *Lachnosterna arcuata*.

TRICHOPHORA Macq.

T. ruficauda V. d. W. Westville, VII, 24, VIII, 14 (Ju), Caldwell (Cr).

CUPHOCERA Macq.

C. fucata V. d. W. New Brunswick, Ocean Co. (Sm), Westville, VI, 14, Jamesburg, VII, 4, Atco, IX, 11.

ARCHYTAS Jaen.

- A. hystrix* Fabr. Westville, VII, 10, Shark River, VII, 12, Clementon, VIII, 6 (Jn), Caldwell (Cr).
A. aterrima Desv. Caldwell (Cr), Atco, VI, 6, Morris Plains, VI, 25, Avalon, VI, 30, Dunnfield, Del. Water Gap, VII, 14, Westville, VIII, 23 (Jn) : a parasite of *Acronycta occidentalis*, *Lagoa crispata*, etc.

ECHINOMYIA Dumeril.

- E. decisa* Walk. "New Jersey" (Coq).
E. florum Walk. Clementon, V, 10, Atco, VI, 4, Buena Vista, VI, 11.
E. dakotensis Town. Buena Vista, VI, 11, Atco, IX, 11 (Jn), Anglesea (W).

EPALPUS Rond.

- E. signifera* Walk. Riverton, IV, 17, Westville, IV, 19, 26 (Jn), Atco, IV, 2 (Kp), New Brunswick (Sm), Caldwell (Cr).

BOMBYLIOMYIA Br. and Berg.

- B. abrupta* Wied. Morris Plains, Dunnfield, Del. Water Gap, VII, 14 (Jn), Camden, IX, 2 (Kp), Caldwell (Cr), Fort Lee (Bt), Trenton (US Agr).

JURINIA Desv.

- J. metallica* Desv. Chester (Dkn).

Family DEXIIDÆ.

The "nimble flies" of Comstock, differ from the Tachinids which they otherwise resemble, in the longer legs and in having the bristle of the antennæ plumose to the tips. They are much less abundant than the preceding but are also parasitic in habit.

MYOCERA Desv.

- M. cremides* Walk. Buena Vista, VI, 11, Woodbury, VII, 7, Westville, VI, 21, Atco, VI, 18.
M. tibialis Desv. Common, Clementon, V, 16, Riverton, V, 29, Orange Mts., VII, 4, Delaware Water Gap, VII, 14.

PARAPROSENA Br. and Berg.

- P. apicalis* Desv. Dover, VI, 7, Del. Water Gap, VII, 14.

PHASIOPA Coq.

- P. flava* Coq. Caldwell (Cr).

EUANTHA V. d. Wulp.

E. liturata Oliv. DaCosta, VII, 30.

ZELIA Desv.

Z. vertebrata Say. Delaware Water Gap, VII, 8.

MELANOPHORA Meig.

M. rorulis Linn. Clementon, VIII, 6, Avalon, VII, 29, Del. Water Gap, VII, 12.

METADEXIA Coq.

M. basalis Giglio-Tos. Dover, VI, 23.

THELAIRA Desv.

T. leucozona Panz. Avalon, VII, 22.

Family SARCOPHAGIDÆ.

These are the "flesh flies," so called because they lay their eggs on exposed meats or other animal matter, these eggs being either ready to hatch or actually hatched when laid. The antennal bristle is here plumose at the base and bare at tip, and as scavengers the insects are useful, some larvæ occurring in excrement and decay of all sorts.

SARCOPHAGA Meig.

S. carnaria Linn. Cape May, VI, 14, Anglesea, VII, 19. This is the common flesh-fly.

S. ægra Walk. Westville, V, 19, Anglesea, VII, 19.

S. georgiana Wied.? Common throughout the State.



Fig. 319.—The flesh-fly, very much enlarged.

HELICOBIA Coq.

H. helcis Town. Avalon, VII, 22.

Family MUSCIDÆ.

This family contains the common house-fly, the stable fly, the horn-fly, the blow-fly, and similar well-known insects. All of these have the antennal bristle hairy or plumose to the tip, but have no spines on the abdomen except at the end, about the anal segments.

The larvæ of these flies are true maggots, and with few exceptions they live in decaying material of all kinds, excrement, putrid meat, garbage, &c. Eggs are laid in masses and hatch in a few hours, the larval life being often scarcely a week.

As scavengers these insects are useful, but they become a nuisance in the house and in the stable. While the majority of the flies gain their living by scraping and lapping liquid or pasty foods, a few of them are blood-suckers, the mouth being developed for piercing and sucking.

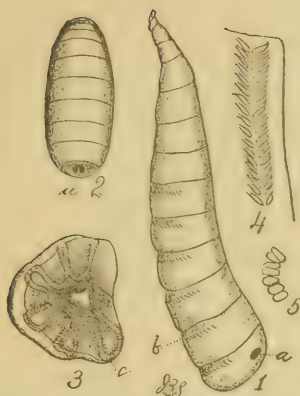


Fig. 320.—Larva, pupa and larval structures of the horn-fly: enlarged.

CYNOMYIA Desv.

C. cadaverina Desv. Westville, IX, 9, Clementon, V, 9.

POLLENIA Desv.

P. rudis Fabr. Common, Westville, VII, 26, Merchantville, VI, 28, Clementon, VIII, 9 (Jn), New Brunswick (Sm), Palisades, V, 24 (Love): this is a larger fly than the common house-fly, but is also found on windows, especially in late summer.

CHRYSOMYIA Desv.

C. macellaria Fabr. Common, Anglesea, VII, 4, 10, 19, Westville, VIII, 16 (Jn), New Brunswick (Sm): the larva of this fly, known as the screw-work, has done great harm in the southwest, but is not injurious in New Jersey.

PHORMIA Desv.

P. terræ-novæ Desv. Westville, VI, 15, Dover, VI, 17.

P. regina Meig. Common, Westville, V, 15, Jamesburg, VII, 4, Avalon, VII, 22, (Jn), New Brunswick (Sm), Caldwell (Cr).

CALLIPHORA Desv.

C. erythrocephala Meig. Common, Westville, Riverton, New Brunswick, Snake Hill, Dover, IV to X: throughout the State.

C. vomitoria Linn. Prospertown, VI, 1 (Sm), Caldwell (Cr): this is the common "blow-fly" which occurs everywhere in the State.

C. viridescens Desv. Westville, IV, 9.

LUCILIA Desv.

L. cæsar Linn. Common throughout the State, IV to XI.

L. sylvarum Meig. Westville, V, 19, Anglesea, VII, 10, Atlantic City, Jamesburg.

L. sericata Meig. Clementon, V, 9, Riverton, IX, 9 (Jn), Atlantic Highlands, VII, 11 (Love).

PSEUDOPYRELLIA Girschner.

P. cornicina Fabr. Westville, Riverton, IX, 9.

MUSCA Linn.

M. domestica Linn. House-fly, common throughout the State all year around in sheltered places. It breeds preferably in horse-manure, but is not averse to other excrementitious matter.

GRAPHOMYIA Desv.

G. maculata Scop. Clementon, V, 12, VIII, 8, Jamesburg, VII, 4.

MORELLIA Desv.

M. micans Macq. Common, Newark, VI, 16, Westville, VII, 21, Shiloh, IX, 1 (Jn), New Brunswick (Sm).

HÆMATOBIA Desv.



Fig. 321.—The horn-fly, *Hæmatobia serrata*: *a*, egg; *b*, fly; *c*, *d*, head and mouth parts; much enlarged.

H. serrata Desv. "The horn-fly," common throughout the State, but not so abundant as in previous years. Cattle may be protected from its attacks by sponging lightly with fish oil, to which a little crude carbolic acid has been added.

STOMOXYS Geoff.

S. calcitrans Linn. The "stable-fly," common throughout the State: a great pest to cattle (Sm).

MUSCINA Desv.

M. stabulans Fall. New Brunswick, VI, VII (Sm), Westville, VII, 5, Shark River, VII, 9.

M. assimilis Fall. Westville, IV, 9 (Jn), New Brunswick, Monmouth county, VII (Sm).

MYOSPILA Rond.

M. mediatubunda Fabr. Westville, VII, 21, Clementon, V, 10.

Family ANTHOMYIDÆ.

The flies of this family so closely resemble those of the preceding that, to the ordinary observer, they seem to be alike. Some of the species come into houses at times and are not usually noticed as being different from the common species

In the larval stages the habits differ. Many, perhaps the most, are scavengers, as are the muscids; a few are parasitic, as are the Tachinids; quite a number feed in living vegetation, either in roots, as the onion and cabbage maggot, or mining leaves, as in beet.

The root maggots are difficult to deal with and not all methods are equally useful in all localities. Tobacco, hellebore, kainit, lime with carbolic acid or turpentine have all been used as repellants or destroyers with more or less success.

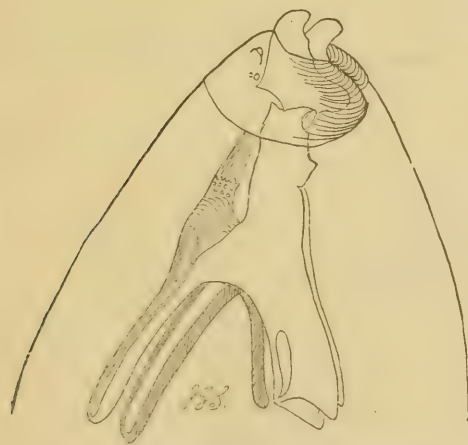


Fig. 322.—Head and scraping hooks of a root maggot very much enlarged.

Bisulphide of carbon injected into the soil has proved useful in some cases, and so has a tarred card surrounding a plant and resting on the surface. The farmer must usually learn by experience the particular method most useful in his locality.

HYDROTÆA Desv.

- H. dentipes* Fabr. "New Jersey," without data.
H. armipes Fall. Riverton, V, 14, Avalon, VII, 22 (Jn), New Brunswick (Sm).
H. impexa Loew. Dunnfield, Del. Water Gap, VII.

OPHYRA Desv.

- O. leucostoma* Wied. Da Costa, VII, 19, Westville, VII, 21, Shiloh, IX, 1.

HOMALOMYIA Bouché.

- H. canalicularis* Linn. New Brunswick, VII, Burlington Co. (Sm).
H. scalaris Fabr. Del. Water Gap, VII (Jn), New Brunswick (Sm).
H. insisurata Zett. Shark River, VII, 12.
H. fasciculata Loew. Delaware Water Gap, VII.

ARICIA Desv.

- A. houghii* Stein. Woodbury, VI, 7, Del. Water Gap, VII, 11.
A. leucorum Fall. Clementon, V, 16, Del. Water Gap, VII, 8.
A. errans Meig. Delaware Water Gap, VII, 14.
A. serva Meig. Delaware Water Gap, VII, 12, 14.

SPIOLOGASTER Macq.

- S. pagana* Fabr. Newark, VI, 16, Merchantville, VI, 28, Westville, VII, 21, Del. Water Gap, VII, 14.
S. fusca Stein. Atco, VI, 6.
S. abiens Stein. Delaware Water Gap, VII, 11.
S. amœba Stein. Riverton, V, 29.
S. humeralis Zett. Westville, VI, 6.
S. urbana Meig. Del. Water Gap, VII, 14.
S. demigrans Zett. Atco, VI, 6.
S. palposa Walker? (*S. crepuscularis* Stein). Del. Water Gap, VII, 8, Westville, VIII, 14.
S. divuta Stein. Princeton, VII, 21, Shiloh, IX, 1.

LIMNOPHORA Desv.

- L. æquifrons* Stein. New Brunswick (Sm).
L. cyrtoneurina Stein. = *Leucomelina garrula* Giglio-Tos.? Sea Isle City, VII, 22.

ANTHOMYIA Meigen.

A. pluvialis Linn. New Brunswick, VIII, 5.

A. albicincta Fall. Farmingdale, VII, 14, Atco, IX, 9, Jamesburg.

A. antiqua Meig. = *ceparum* Bouché. The onion maggot; often a pest in South Jersey.

A. radicum Linn. Jamesburg, VII, 15 (Sm); this is *raphani* Harr., the radish maggot, and often decidedly troublesome in various sections.

A. pratincola Panz. Atco, VII, 9 (Li).

A. lata Walk. Clementon, V, 10.

A. ruficeps Meigen. = *brassicæ* Bouché. The common cabbage maggot; occurs throughout the State, some seasons very abundantly.

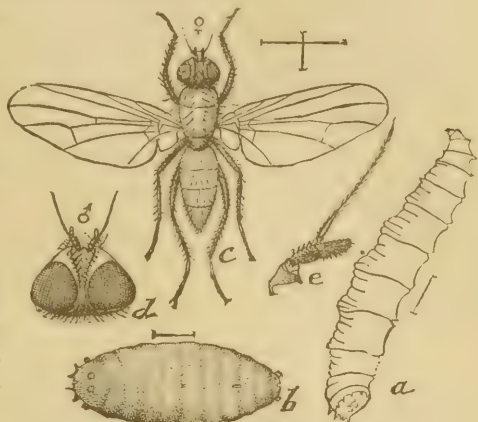


Fig. 323.—The cabbage maggot, *Anthomyia ruficeps*: a, larva; b, pupa; c, adult: all enlarged.

HELEMYIA Desv.

H. lipsia Walk. Dover, VI, 18, Del. Water Gap, VII, 12.

H. anana Walk. Newark, VI, 16.

EUSTALOMYIA Kow.

E. vittipes Zett, Delaware Water Gap, VII, 8.

CHORTOPHILA Rond.

C. cilicrura Rond. Common, Cumberland Co., Burlington Co., V (Sm), Palisades, IV, 4, Atlantic Highlands, VII, 11 (Love), Westville, VII, 2, VII, 2, Jamesburg, VII, 4, Riverton, IX, 25.

C. acra Walk. Caldwell (Cr).

C. cinerella Fall. Newark, V, New Brunswick (Sm).

C. lævis Stein. Riverton, VII, 24.

C. n. sp.? Clementon, V, 10 (Sm).

C. n. sp. Cumberland Co. (Sm).

PEGOMYIA Macq.

P. vicina Lintner. Westville, VII, 21, Farmingdale, VII, 14: this is one of species mining the leaves of beets in the larval stage.

P. latitarsis Stein. Delaware Water Gap, VII, 15.

P. unicolor Stein. Delaware Water Gap, VII, 15.

HYETODESIA Rond.

H. pylone Walk. Clementon, V, 16.

LISPA Latr.

L. uliginosa Fall. Jamesburg, VII, 4.

HAPLOGASTER Rond.

H. nigritarsis Stein. Woodbury, V, 14, Clementon, V, 30, VIII, 11, Avalon, VII, 29.

LISPOCEPHALA Pak.

L. lacteipennis Zett. Delaware Water Gap, VII, 15.

CARICEA Desv.

C. intacta Walk.? Delaware Water Gap, VII, 14.

C. antica Walk. Ocean County, V (Sm), Westville, VII, 5, Anglesea, VII, 19, Sea Isle City, VII, 22.

C. substituta Walk. Woodbury, V, 14, Clementon, V, 30, VIII, 11, Avalon, VII, 29.

C. fuscopunctata Macq. New Brunswick, VII (Sm).

C. n. sp. Delaware Water Gap, VII, 14.

CENOSIA Meigen.

C. nivea Loew. Atco, VII, 12, Anglesea, VII, 19, Avalon, VII, 29, Delaware Water Gap, VII, 15.

C. calopyga Loew. Merchantville, VI, 28.

C. aurifrons Stein. = *A. ansoba* Walk. Shiloh, IX, 1, Westville, V, 24.

C. canescens Stein. Atlantic City, VII, 15, Anglesea, VII, 19.

C. nudiseta Stein. Anglesea, V, 28 (Sm).

C. triseta Stein. Jamesburg, VII, 4.

SCHENOMYZA Haliday.

S. dorsalis Loew. Anglesea, V, 28, Ocean Co., V (Sm).

S. chrysostoma Loew. Riverton, IV, 30, Shark River, VII, 12.

FUCELLIA Desv.

F. fucorum Fall. Clementon, IV, 15.

Family SCATOMYZIDÆ.

Resembles the preceding family and differentiated from it by characters obvious to the specialist only. The larval habits are various, a number occurring in stems of *Rumex*; but they are not at any time economically important.

SCATOPHAGA Meig.

S. stercoraria Linn. Common, Camden, IV, 18 (Kp), Anglesea, V, 28, Newark, VI, 17, Avalon, VI, 30.

S. furcata Say. Common, Camden, IV, 18 (Kp), Jamesburg, IV, 8, V, 14, New Brunswick, IV, 20 (Sm).

S. pallida Wlk. Delaware Water Gap, VII, 14.

CORDYLURA Fall.

C. latifrons Loew. Westville, V, Shark River, VII, 12, Riverton, VI, 19.

C. setosa Loew. "New Jersey" (Am Ent Soc.)

C. pleuritica Loew. Newark, VI, 6, Clementon, V, 12.

C. præusta Loew. Clementon, V, 30, Westville, VI, 12.

C. gracilipes Loew. Clementon, V, 9, Woodbury, V, 14, Del. Water Gap, VII, 12.

PARALLELOMMA Becker.

P. bimaculata Loew. Buena Vista, VI, 7, Westville, VII, 2, Clementon, V, 30.

Family HELOMYZIDÆ.

The species of this family have the abdomen long, broad and more or less flattened, the male genitalia being also somewhat prominent. The wings are comparatively large and the costa is bristly. The larvæ live in dung of bats, rabbits, truffles, decaying wood, &c., and are not in any way harmful.

HELOMYZA Fallen.

H. longipennis Loew. Dunnfield, Del. Water Gap, VII, 11.

H. plumata Loew. Dunnfield, Del. Water Gap, VII, 11.

LERIA Desv.

L. pectinata Loew. Sea Isle City, VII, 22.

L. pubescens Loew. Clementon, V.

L. tristis Loew. Newark, VI.

ALLOPHYL Loew.

A. lævis Loew. Delaware Water Gap, VII, 12.

SCOLIOCENTRA Schles.

S. helvola Loew. Dunnfield, Del. Water Gap, VII, 14, Newark, VI, 13.

Family SCIOMYZIDÆ.

Head rounded, short, as broad or broader than the thorax, face retreating, abdomen long and narrow. Legs and wings are long, the latter exceeding the abdomen. The flies occur along the banks of streams in which the larvæ live, and the wings are often ornamented. None are harmful in any way.

SCIOMYZA Fallen.

S. nana Fallen. Camden, VIII, 24, Riverton, IX, 11.

S. obtusa Fallen. Westville, V, 19.

TETANOCERA Latr.

T. arcuata Loew. Dover, VI, 18, Merchantville, VI, 28.

T. flavescens Loew. Morris Plains, VI, 25, Westville, VII, 12, Del. Water Gap, VII, 8, 15.

T. combinata Loew. Westville, V, 19, Lenola, V, 30, Woodbury, VI, 7 (Jn) Elizabeth, VII, 24 (Kp).

T. sparsa Loew. Dunnfield, Del. Water Gap, VII, 15.

T. pallida Loew. Camden, VI, 6 (Kp), Atco, VII, 9, Dunnfield, Del. Water Gap, VII, 8.

T. pictipes Loew. Westville, V, 19, Lenola, V, 30, Dunnfield, Del. Water Gap, VII, 15.

T. saratogensis Fitch. Mullica Hill, V, 30, Atco, VII, 9, Anglesea, VII, 25.

T. clara Loew. Atco, VI, 17, Merchantville, VI, 28, Clementon, VIII, 9, Dunnfield, Del. Water Gap, VII, 8.

T. plebeja Loew. Woodbury, VI, 7, Westville, VIII, 28, Dunnfield, Del. Water Gap, VII, 8.

T. plumosa Loew. Lenola, V, 30, Atlantic City, VIII (Jn), Jamesburg, VIII, 10 (Sm).

SEPEDON Latr.

S. armipes Loew. Lenola, V, 30, Westville, V, 19.

S. pusillus Loew. Westville, V, 19, VII, 21.

S. fuscipennis Loew. Westville, IV, 19, V, 19, VIII, 23.

DRYOMYZA Fallen.

- D. simplex* Loew. Dunnfield, Del. Water Gap, VII, 14, Dover, VI, 18.
D. anilis Fall. Dunnfield, Del. Water Gap, VII, 12.
-

Family ORTALIDÆ.

Small or medium-sized flies, often with metallic colors, the wings banded with brown or black. The head of good size, the front broad, and the legs stout and only moderately long. The larval stages are not well known.

PYRGOTA Wied.

- P. undata* Wied. Caldwell (Cr), Orange Mts., Woodbury, V, 22 (Greene), Atco, VI, 19 (Nell).
P. valida Harris. Westville, V, 18 (Kp), VII, 2 (Lt), Caldwell, V, 16 (Cr).

AMPHICNEPHES Loew.

- A. pulla* Wied. Atco, VI, 4, Buena Vista, VI, 11, Newark, VI, 16, Jamesburg, VII, 4, Da Costa, VII, 30.

RIVELLIA Desv.

- R. conjuncta* Loew. Anglesea, V, 28 (W), Buena Vista, VI, 14 (Li), Jamesburg, VII, 4, Atco, VII, 12.
R. viridulans Desv. Caldwell (Cr), Ocean Co., V, and probably throughout the State (Sm), Newark, VI, 16, Morris Plains, VI, 25.
R. quadrifasciata Macq. Common, Anglesea, V, 28 (W), New Brunswick, VII, 30 (Sm), Westville, VI, 26, Jamesburg, VII, 15, Clementon, VIII, 8.
R. flavimana Loew. Westville, V, 19.
R. variabilis Loew. Anglesea, V, 28 (W), VII, 19, Avalon, VII, 29.
R. pallida Loew. Ocean Co., V (Sm), Newark, VI, 13.

TETANOPS Loew.

- T. luridipennis* Loew. Da Costa, VII, 30, Clementon, VIII, 9, Camden, VIII, 24.

TEPHRONOTA Loew.

- T. humilis* Loew. Buena Vista, VI, 11, Jamesburg, VII, 4, Atco, VII, 9.

STICTOCEPHALA Loew.

- S. vau* Say. Westville, VII, 21 (Jn), Prospertown, IX 25 (Sm).

TRITOMA Loew.

T. flexa Wied. Woodbury,
VI, 7, Atco, VI, 18,
Westville, VIII, 23.

T. incurva Loew. Caldwell
(Cr).

CAMPTONEURA Macq.

C. picta Fabr. New Brun-
swick, VI, 28 (Sm),
Westville, VI, 15, VIII,
28, IX, 13, Anglesea,
VII, 19, Avalon, VIII, 29, Riverton, X, 9.



Fig. 324.—The onion-fly, *Tritoma flexa* and its larva: enlarged.

IDANA Loew.

I. marginata Say. "New Jersey" (Coll Am Ent Soc).

CALLOPISTRIA Loew.

C. annulipes Macq. New Jersey (Wilt, Am Ent Soc).

SEOPTERA Loew.

S. vibrans Linn. Caldwell (Cr).

S. colon Loew. New Jersey.

EUXESTA Loew.

E. notata Wied. Cumberland Co., bred from onion (Sm), Riverton, V, 29,
VIII, 21, Westville, VI, 27 (Jn).

E. scoriacea Loew. Sea Isle City, VII, 22.

CHÆTOPSIS Loew.

C. ænea Wied. Common, New Brunswick (Sm), Lenola, V, 30, Cape May,
VI, 14, Anglesea, VII, 16.

STENOMYIA Loew.

S. tenuis Loew. Atco, VI, 4, 18, Buena Vista, VI, 11, Da Costa, VII, 30,
Clementon, VIII, 6.

EUMETOPIA Macq.

E. rufipes Macq. Westville, VII, 4, 21, Camden, VIII, 24.

SEPSISOMA Johns.

S. flavescens Johns. Westville, VIII, 19.

Family TRYPETIDÆ.

The "peacock flies," so-called because of their habit of elevating the wings and strutting about, peacock like. These wings are often prettily marked and spotted with black or brown. In the female the abdomen is often prolonged into a horny ovipositor. The flies are gracefully built, fly slowly and are noticeable by keeping their wings in constant motion. Most of the members of the series feed in plant tissue of some kind, either in leaves, in stems or in fruits, and a number of them are gall-makers. The only species of economic importance in this State is the "apple maggot," which injures some of the early summer varieties. The only remedial measure is the prompt removal of all fruit from trees known to be infested.

ACIDIA Desv.

A. fratria Loew. A New Jersey specimen without data.

STRAUSSIA Desv.

S. longipennis Wied. Orange Mts., Elizabeth, V, 21 (Kp), Caldwell (Cr), Fort Lee (Bt), Camden, V, 26 (Kp).

ZONOSEMA Loew.

Z. flavonotata Macq. Glassboro, VII, 6 (Greene).

PLAGIOTOMA Loew.

P. obliqua Say. Clementon, VIII, 6, New Jersey (Bt).

TRYPETA Loew.

T. palposa Loew. Anglesea, V, 28-30 (W), Avalon, VI, 8; on the thistle.

T. vernoniæ Loew. Clementon, VIII, 6, Lenola, VIII 7, Westville, VIII, 16: on iron weed.

T. achilleæ Johns. Avalon, VI, 30: on yarrow (*Achillea millefolium*).

CEDASPIIS Loew.

O. atra Loew. Riverton, VI, 18, Cape May, VI, 14, Avalon, VI, 8, Anglesea, V, 28 (W).

O. polita Loew. Generally distributed; forms a gall on *Solidago* (Bt).

RHAGOLETIS Loew.

R. cingulata Loew. Long Branch, VII (O S), Atlantic Highlands, VII, 11 (Love).

R. tabellaria Fitch. Caldwell (Cr), Buena Vista, VII, 10 (Li), Jamesburg, VII, 4.

R. pomonella Walsh. Montclair, the apple maggot, locally injurious; but seems confined to very few varieties (Sm).

EUROSTA Loew.

E. comma Wied. Glassboro, IX, 19 (Greene), Chester (Dkn).

E. solidaginis Fitch. Clementon, V, 10, Ft. Lee (Bt).

E. conspurcata Doane. "New Jersey" (Doane).

NEASPILOTA O. S.

N. alba Loew. Clementon, VIII, 6, Lenola, VIII, 7: on *Vernonia noveboracensis*, iron weed.

N. albidipennis Loew. Clementon, VIII, 6, Lenola, VIII, 7, Westville, VIII, 14: on iron weed.

EUTRETA Loew.

E. sparsa Loew. Caldwell (Cr), "New Jersey" (Bt).

ICTERICA Loew.

I. circinata Loew. Westville, VIII, 23, IX, 13.

I. seriata Loew. New Jersey (Doane).

TEPHRITIS Latr.

T. geminata Loew. Jamesburg, VII, 4, Atco, VII, 12.

T. albiceps Loew. Caldwell (Cr), "New Jersey" (Bt).

T. æqualis Loew. Westville, VIII, 28: on *Ambrosia artemisiæfolia*, rag weed.

EURÆSTA Loew.

E. bella Fitch. Common, Clementon, VI, 8, Jamesburg, VII, 4, Atco, VII, 9 (Jn), Caldwell (Cr), New Brunswick, VII, 20 (Sm).

E. festiva Loew. Westville, VIII, 13, 28.

URELLIA Desv.

U. abstersa Loew. Avalon, VII, 22.

U. solaris Loew. Cape May, VI, 22.

Family LONCHÆIDÆ.

Has all the important characters of the next family; but the ovipositor is flattened and horny.

LONCHÆA Fallen.

L. rufitarsis Macq. Larvæ and pupæ were found at Riverton in decayed wood, IV, 3, imago appeared IV, 16 (Jn), Lahaway, VII, 5 (Sm), Atco, VII, 7, Palisades, VI (Love).

Family SAPROMYZIDÆ.

Small species, the head as broad or broader than the thorax, antennæ short and porrect, legs never elongate. The ovipositor is not horny but ends tube-like. The larvæ are slender and live in decaying vegetation.

SAPROMYZA Fallen.

- S. decora* Loew. South Camden, VI, 6 (Li).
S. compedita Loew. Anglesea, V, 28 (Sm), Atco, VI, 4, VII, 9, Jamesburg, VII, 4.
S. philadelphica Macq. Anglesea, V, 28 (W), New Brunswick, VII, 20, Jamesburg, VII, 15 (Sm).
S. fraterna Loew. Merchantville, VI, 28.
S. umbrosa Loew. Lahaway, VI, 21 (Sm), Atco, VI, 17, Merchantville, VI, 28, Anglesea, VII, 10.
S. macula Loew. Atco, VII, 7.
S. bispinosa Loew. Anglesea, VII, 19, V, 28, Jamesburg, VII (Sm).
S. vulgaris Fitch. Anglesea, VII, 19, Jamesburg, VII, 4.
S. quadrilineata Loew. Clementon, V, 30, Merchantville, VI, 28, Jamesburg, VII, 4.
S. lupulina Fabr. Common, Clementon V, 30, Jamesburg, VII, 4 (Jn), Middlesex County, VII, 7 (Sm).
S. longipennis Meig. Clementon, V, 10.
S. innuba Giglio-Tos. Riverton, VI, 20.

PACHYCERINA Macq.

- P. verticalis* Loew. Anglesea, VII, 19, Merchantville, VI, 28.

LAUXANIA Latr.

- L. obscura* Loew. Common, Mullica Hill, Clementon, V, 30, Dover, VI, 17, Jamesburg, VII, 4.
L. gracilipes Loew. Clementon, VIII, 11, Lenola, VIII, 7, Delaware Water Gap, VII, 11 (Jn), Palisades, VII, 26 (Love).
L. cylindricornis Fabr. Ocean Co., V (Sm), Clementon, V, 30.
L. latipennis Coq. Buena Vista, VI, 7 (Li).
L. opaca Loew. Buena Vista, VI, 8 (Li), Avalon, VI, 9.
L. muscaria Loew. Merchantville, VI, 28, Avalon, VI, 8.

Family HETERONEURIDÆ.

Small flies with a large hemispherical head, the front broad and bristly to the base of the antennæ, which are short. Abdomen elongate, narrow, somewhat

compressed, wings broad and long, legs long. The larvæ are slender, cylindrical, and live in decaying wood, under bark of trees, &c.

HETERONEURA Fallen.

H. latifrons Loew. Dunnfield, Del. Water Gap, VII, 8 to 15 (Jn), Jamesburg, VII, 15 (Sm).

H. albimana Meig. Delaware Water Gap, VII, 12.

H. pictipes Zett. Westville, VI, 6, Riverton, V, 14.

CLUSIA Haliday.

C. flava Meig.? Jamesburg, VII, 15 (Sm), Ft. Lee, IV (Love).

ISCHNOMYIA Loew.

I. vittata Loew. Westville, VII, 2, Dunnfield, Del. Water Gap, VII, 12, Princeton, VII, 21.

Family OPOMYZIDÆ.

Small flies with the chief characters of the *Geomyzidæ*, but with a flattened occiput and maculate wings.

SCYPHELLA Desv.

S. flava Linn. New Brunswick (Sm).

Family SEPSIDÆ.

"The flies belonging to this family are usually small, black and elongated with the abdomen narrowed at the base, thickened and curved downward toward the extremity; with transparent, iridescent wing, usually hyaline, but often with a spot or spots toward the end, and are usually observed about decaying vegetables, excrement, cheese, ham, &c., often in swarms. The flies, for the greater part, run about actively, and are quick in flight. The best known are the species of *Piophilæ*, the larvæ of which are known as 'cheese-mites.' These larvæ live in cheese, in ham or bacon, or, in general, in any fatty material, and often do much damage, being especially troublesome in pork-packing establishments. From the peculiar power of leaping possessed by the maggots they are often called 'skippers'; the act is performed by the larva seizing with its extended mouth hooklets the edge of the posterior truncature of the body and then suddenly releasing it while pulling hard."—*Williston*.

SEPSIS Fallen.

- S. violacea* Meig. Common, New Brunswick, VII, 20, Jamesburg, VII, 15, Ocean Co., V (Sm).
S. sp. Westville, VIII, 19.

NEMOPODA Desv.

- N. cylindrica* Fabr. Dover, VI, 17, Morris Plains, VI, 25, Riverton, IX, 17.
N. minuta Wied. Riverton, VII, 3, Newark, VI, 14.

PIOPHILA Fallen.

- P. casei* Linn. Riverton, VIII : this is the cheese mite or skipper.

PROCHYLIZA Walk.

- P. xanthostoma* Walk. Riverton, X, 9.
-

Family PSILIDÆ.

Slender flies of moderate size, with large wings, long legs and at least moderately long antennæ. The larvæ, so far as known, live in roots or galls.

LOXOCERA Meigen.

- L. cylindrica* Say. Mullica Hill, Clementon, V, 30, Del. Water Gap, VII, 12, Woodbury, VI, 7, Camden, VI, 10.
L. pectoralis Loew. Dunnfield, Del. Water Gap, VII, 11.
L. pleuritica Loew. Dunnfield, Del. Water Gap, VII, 12.

PSILA Meigen.

- P. bivittata* Loew. Clementon, Lenola, V, 30.
P. collaris Loew. Newark, VI, 13, 16, Atco, VI, 4 (Jn), Clementon, VI, 7 (Li).
P. lateralis Loew. Riverton, VI, 20.

CHYLIZA Fallen.

- C. notata* Loew. Caldwell (Cr).
C. apicalis Loew. Riverton, VII, 2.

Family MICROPEZIDÆ.

Flies slender or very slender with large wings and long legs, moderate in size, antennæ variable, face retreating in profile. The larval habits are not definitely known.

CALOBATA Meigen.

C. antennipennis Say. Jamesburg, VII, 4, Dunnfield, Del. Water Gap, VII, 8, Princeton, VII, 21.

C. lasciva Fabr. South Atlantic City, VII (Ju), Anglesea (W).

C. univittata Walk. Cramer Hill, V, 30 (Greene), Princeton, VII, 21.

C. alesia Walk. New Jersey, V (Coll Am Ent Soc).

Family EPHYDRIDÆ.

"The flies of this family are never large, often small or even minute. The greater number of the species are inhabitants of wet places, about marshy ground, meadows, etc. They are always thinly pilose or bare species, and never with bright colors. The exceedingly large head and mouth of some species are very characteristic, but in others this character is not so apparent, and there is sometimes difficulty in separating the genera from those of the Drosophilidæ. The larvæ of many forms are very peculiar, resembling the rat-tailed larvæ of the Syrphidæ in many cases" -- *Williston*.

In New Jersey the species are not notably abundant; but they occur in countless millions in the great salt lake in Utah, and in other alkaline lakes and ponds of the northwestern desert region.

DICHÆTA Meigen.

D. brevicauda Loew. New Jersey (Coll Am Ent Soc), Ocean County, V (Sm).

NOTIPHILA Fallen.

N. carinata Loew. Cape May, VI, 22.

N. scalaris Loew. Shark River, VII, 12.

N. vittata Loew. Woodbury, VI, 7.

PARALIMNA Loew.

P. appendiculata Loew. Westville, V, 19, Riverton, IX, 11, Cumberland County, IX, 1.

PSILOPA Fallen.

P. atrimana Loew. Riverton, X, 9.

P. scoriacea Loew. Delaware Water Gap, VII, 13.

DISCOCERINA Macq.

D. lacteipennis Loew. Cape May, VI, 14.

HYDRELLIA Desv.

H. scapularis Loew. Riverton, IX, 19.

OCHTHERA Latr.

O. mantis DeGeer. Clementon, V, 30 (Jn), S. Camden, VII, 1 (Kp).

PARYDRA Stenhammer.

P. bituberculata Loew. Dunnfield, Del. Water Gap, VII, 15.

P. pinguis Walk. Shark River, VII, 12.

EPHYDRA Fallen.

E. subopaca Loew. New Jersey (Bt).

E. nana Walk. Cramer Hill, VIII, 24, Riverton, X, 9.

SCATELLA Desv.

S. stagnalis Meig. Avalon, VII, 22, Riverton, X, 9.

S. flavillacea Loew. Cape May, VI, 14.

S. oscitans Walk. Clementon, V, 14 (Greene).

CÆNIA Desv.

C. spinosa Loew. Ocean Co., V (Sm), Cape May, VI, 22, Anglesea, VII, 19.

ILYTHEA Haliday.

I. spilota Curtis. Riverton, IX, 17.

LEPTOCHÆTA Coq.

L. slossonæ Coq. Cape May, VI, 6, Anglesea, VII, 19.

Family GEOMYZIDÆ.

Small or even minute flies with comparatively large wings. The antennæ are short, arista variable, front broad and bristly below the apex. The larvæ, so far as known, live in the stems of plants.

DIASTATA Meig.

D. pulchra Loew. "New Jersey" (Am Ent Soc).

D. nebulosa Fall. Clementon, V, 16.

CURTONOTUM Macq.

C. helva Loew. New Brunswick, VII, 7 (Sm), Westville, VII, 26, VIII, 23, Princeton, VII, 21, Atco, VII, 9.

ANTHOMYZA Fallen.

A. variegata Loew. Ocean Co., V (Sm), Del. Water Gap, VII, 12.

Family DIOPSIDÆ.

Our only species belonging to this family is easily recognized by the two lateral horns or processes from the side of the head upon which the eyes are situated. It occurs on skunk cabbage.

SPHYRACEPHALA Say.

S. brevicornis Say. "New Jersey" (Bt).

Family DROSOPHILIDÆ.

The species in this family are small, plump, without pile, the bristles of the head and legs conspicuous. Abdomen usually short and broad, genitalia not prominent, colors tending to yellow. They are often abundant about decomposing or fermenting fruit, about cider-mills, wine-presses, &c., whence they are called "pommace flies." The larvæ live in this pommace and on the surface of the scum of the fermenting fruit juice.

PHORTICA Schiner.

P. vittata Coq. Avalon, VI, 8, Delaware Water Gap, VII, 12.

P. leucostoma Loew. Dunnfield, Del. Water Gap, VII, 8, 12, Dover, VII, 16.

P. humeralis Loew. Westville, VII, 26, Riverton, VII, 30.

DROSOPHILA Fallen.

D. amœna Loew. Westville, VII, 21, Glassboro, VIII, 28 (Greene).

D. ampelophila Loew. Common "fruit" or "vinegar fly"; Riverton, VIII, IX, Glassboro, VIII, 27 (Greene), Freehold (Lockwood): everywhere in the State (Sm).

D. funebris Fabr. Riverton, VI, 1.

- D. quadrimaculata* Walk. Del. Water Gap, VII, 12, Merchantville, VI, 28 (Jn), New Brunswick, VII, 20 (Sm).
D. graminum Fall. Anglesea, V, 28 (W).
D. adusta Loew. New Brunswick, VII, 20 (Sm).
D. confusa Stæger. Delaware Water Gap, VII, 13.
D. colorata Walk. Dunnfield, Del. Water Gap, VII, 15.

STEGANA Meig.

- S. coleoptrata* Scop. Delaware Water Gap, VII, 13.
-

Family OSCINIDÆ.

The "frit flies." They are small, bare species, with hemispherical head, flat front, short antennæ, short wings and ovate or elliptical abdomen. The legs are short and moderately stout. They are often colored or banded, and are common in grass and meadow lands. The larvæ live in the stems of grasses of all kinds, and may become locally injurious.

ELACHIPTERA Macq.

- E. eunota* Loew. Avalon, VI, 30.
E. nigriceps Loew. Shark River, VII, 12, Clementon, V, 30, Dreer's, Riverton, VII, 3 : bred from Lotus infested by *Pyrausta nelumbialis*, VII, 13.
E. costata Loew. Princeton, VII, 21 (Jn), New Brunswick, VII, 20, Ocean County, V (Sm).

HIPPELATES Loew.

- H. plebejus* Loew. Anglesea, V, 28 (Sm), Clementon, V, 12, VIII, 8, Avalon, VI, 9.
H. nobilis Loew. Shark River, VII, 12, Avalon, VI, 9, 30.
H. flavipes Loew. Shark River, VII, 12, Riverton, IX, 11.
H. pusio Loew. Riverton, V, 14, X, 9.
H. plumbella Wied. Riverton, V, 14, 1899.
H. bicolor Coq. New Brunswick, VII (Sm).
H. straminea Loew. Riverton, IX, 11.

OSCINIS Latr.

- O. carbonaria* Loew. Ocean Co., V (Sm).
O. trigramma Loew. Anglesea, V, 28 (Sm), Shark River, VII, 12.
O. coxendix Fitch. Riverton, X, 9.
O. soror Macq. Ocean Co., V (Sm).

MEROMYZA Meigen.

M. americana Fitch. Atco, VI, 4, Westville, V, 19, Clementon, V, 12 (Jn); infests wheat, common throughout the state, but not thus far injurious (Sm).



Fig. 325.—Stem maggot fly: *Meromyza americana*.

CHLOROPS Meigen.

C. versicolor Loew. New Brunswick, Anglesea, V, 28 (Sm), Jamesburg, VII, 4, Atco, VII, 9, Clementon, VIII, 6.

C. crocota Loew. Clementon, VIII, 6.

C. sulphurea Loew. Atco, VI, 4, 18, VII, 9.

C. grata Loew. Princeton, VII, 21, Del. Water Gap, VII, 12.

C. assimilis Macq. Newark, Ocean Co., V (Sm), Clementon, V, 9, Princeton, VII, 21, Anglesea, VII, Riverton, X, 9.

C. procera Loew. Clementon, VIII, 8, Asbury Park, VIII, 16, Del. Water Gap, VII, 11.

C. eucera Loew. Jamesburg, VII, 4.

C. unicolor Loew. Riverton, V, 14, Westville, VII, 12, Da Costa, VII, 30, Princeton, VII, 21.

C. variceps Loew. Ocean Co., V (Sm).

C. obscuricornis Loew. Atco, VI, 4, 18.

C. melanocera Loew. Riverton, V, 14.

SIPHONELLA Macq.

S. cinerea Loew. Riverton, X, 9, Cramer Hill, VIII, 24.

S. pumilionis Bjerk. Riverton, VII, 3.

Family AGROMIZIDÆ.

Consists of small or minute flies difficult to separate from the allied groups. The front is broad, the antennæ short, arista absent, or, when present, bare or only pubescent. The wings are broad, venation resembling that of the allied families. The larvæ vary greatly in habits: some are leaf miners, some feed upon plant lice, others occur in galls in which their function is not yet well understood.

TRAGINOPS Coq.

T. irrorata Coq. "New Jersey."

LOBIOPTERA Muhlberg.

L. indecora Loew. Atco, VI, 6, Woodbury, VI, 7, Buena Vista, VI, 11, Avalon, VI, 9.

CERATOMYZA Schiner.

C. dorsalis Loew. Riverton, V, 14, VII, 3, X, 10.

LEUCOPIS Meig.

L. simplex Loew. Clementon, VIII, 6, Avalon, VI, 9, VII, 22, Riverton, VI, 19.

L. nigricornis Egger. Del. Water Gap, bred VII, 20, from willow galls collected, VII, 11.

DESMOMETOPA Loew.

D. m-nigrum Zett. New Brunswick, VIII, 26 (Sm).

D. halteralis Coq. Anglesea, VII, 19, Clementon, V, 12.

AGROMYZA Fallen.

A. coronata Loew. Avalon, VII, 22.

A. melampyga Loew. Jamesburg, VII, 4.

A. simplex Loew. Atco, VI, 4, Riverton, VII, 24, Newark, VI, 13.

A. angulata Loew. Newark, VI, 13, Del. Water Gap, VII, 8.

A. æneiventris Fall. Westville, VII, 21.

A. dimidiata Walk. Ocean Co., V (Sm).

A. magnicornis Loew. Riverton VII, 17.

A. parvicornis Loew. Riverton, VI, 20.

A. jucunda V. d. W. Riverton, IX, 17.

OCHTHIPHILA Fallen.

O. polystigma Meig. Newark, V (Sm), Westville, VII, 21.

O. elegans Panzer. Clementon, V, 30.

Family BORBORIDÆ.

Medium to small black, brown or yellowish flies, having a short, quick flight. They are almost invariably found about decomposing organic matter, and often hover in clouds about dung or sewage where their larvæ live.

BORBORUS Meigen.

B. equinus Fall. Westville, V, 19, Newark, VI, 16.

LIMOSINA Macq.

L. limosus Meig. Ocean Co., V, New Brunswick, VII (Sm).

SPHÆROCERA Latr.

S. subsultans Fabr. Woodbury, V, 14 (Jn), Newark (Sm).

Family PHORIDÆ.

Small hunch-back flies with large, broad wings, often observed running about on fallen leaves, windows, &c. The larvæ are cylindrical, thinner in front than behind, and live in dead snails, insects, decaying fungi, vegetables, &c., and possibly in living insects.

TRINEURA Meig.

T. aterrima Fabr. Clementon, V, 9, Del. Water Gap, VII, 8.

PHORA Latr.

P. rufipes Meig. Del. Water Gap, VII, 12, Riverton, V, 23.

P. fasciata Fall. Delaware Water Gap, VII, 8.

P. interrupta Zett. Delaware Water Gap, VII, 8, 12.

P. nigriceps Loew. Ocean Co., V (Sm), Del. Water Gap, VII, 12, Shark River, VII, 12.

P. albidihalteris Felt. Types bred from mushrooms, New Brunswick (Sm).

P. fungicola Coq. Clementon, V, 9, Del. Water Gap, VII, 12.

P. agarici Lint. Ft. Lee, V (Love).

P. scalaris Loew. Delaware Water Gap, VII, 12.

P. sp. Delaware Water Gap, VII, 12.

Sub-order PUPIPARA.

The term really explains its own meaning, though perhaps the name "louse-flies" may appeal more strongly to the imagination.

The insects are flattened, adapted to live among wool or feathers, and infest chiefly birds of prey. Among animals the sheep only is infested by a "tick,"

which is really a degraded, wingless member of this family. They are termed pupipara because the larva remains in the body of the mother until it is mature and ready to enter the pupal stage.

Family HIPPOBOSCIDÆ.

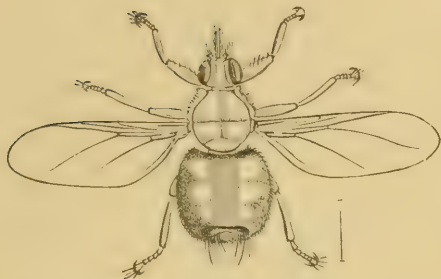


Fig. 326.



Fig. 327.

Fig. 326.—A bird-fly, *Olfersia* sp.: enlarged. Fig. 327.—Bee-louse: *Braula* sp.: much enlarged.

OLFERSIA Wied.

- O. americana* Leach. On the red-tailed hawk, XI, 9, Haddonfield: it also frequents the great horned owl and screech owl.
- O. ardeæ* Macq. On American bittern, IX, 15, 21, X, 10, and night heron, X, 15, shot by Mr. Chas. Liebeck along the Delaware river; little blue heron, Bristol Island, Delaware river (Fowler).

PSEUDOLFERSIA Coq.

- P. maculata* Coq. Cape May, VIII, from a fish hawk (Sk), Lahaway, IV, 1, several specimens from fish hawk, by J. Turner Brakeley.

ORNITHOMYIA Latr.

- O. pallida* Say. On the reed bird, IX, 2, and red-winged black bird, VIII, 19, shot by Mr. Chas. Liebeck along the Delaware river.

MELOPHAGUS Latr.

- M. ovinus* Linn. The "sheep louse-fly"; infests the sheep.

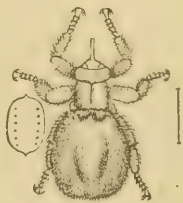


Fig. 328. — "Sheep-tick": *Melophagus ovinus*: enlarged.

SUMMARY.

In the first edition the following resumé was given :

| Order. | Families. | Genera. | Species |
|----------------------------------|-----------|---------|---------|
| Hymenoptera, | 30 | 302 | 1,074 |
| Coleoptera, | 71 | 815 | 2,227 |
| Lepidoptera, | 28 | 484 | 1,140 |
| Diptera, | 57 | 319 | 811 |
| Orthoptera, | 7 | 52 | 117 |
| Hemiptera—Heteroptera, | 26 | 173 | 313 |
| Homoptera, | 10 | 101 | 242 |
| Neuroptera, | 9 | 61 | 174 |
| Totals, | 238 | 2,307 | 6,098 |

In the present list matters stand as follows :

| Order. | Families. | Genera. | Species. |
|-------------------------|-----------|---------|----------|
| Thysanura, | 00 | 00 | 00 |
| Ephemera, | 1 | 12 | 25 |
| Plecoptera, | 1 | 11 | 23 |
| Mallophaga, | 2 | 7 | 23 |
| Isoptera, | 1 | 1 | 1 |
| Corrodentia, | 2 | 11 | 26 |
| Platyptera, | 1 | 3 | 7 |
| Neuroptera, | 5 | 16 | 45 |
| Mecoptera, | 1 | 4 | 10 |
| Trichoptera, | 6 | 25 | 51 |
| Odonata, | 3 | 38 | 90 |
| Thysanoptera, | 1 | 6 | 12 |
| Parasitica, | 1 | 3 | 7 |
| Homoptera, | 11 | 127 | 399 |
| Hemiptera, | 24 | 200 | 340 |
| Dermoptera, | 1 | 4 | 5 |
| Orthoptera, | 6 | 58 | 144 |
| Coleoptera, | 71 | 975 | 2,845 |
| Lepidoptera, | 53 | 615 | 1,570 |
| Hymenoptera, | 84 | 621 | 1,718 |
| Siphonoptera, | 1 | 1 | 3 |
| Diptera, | 53 | 443 | 1,193 |
| Totals, | 329 | 3,181 | 8,537 |

It was predicted in the list of 1890 that "future studies will undoubtedly add at least 20 per cent. more," and this forecast has been more than fulfilled.

I also suggested that while it was then expedient to retain the old Linnæan division into eight orders, I would expect to accept the modern sub-divisions in a future edition. This I have done here, recognizing twenty-two orders, of which the *Parasitica*, *Homoptera* and *Heteroptera* are probably sub-orders of one type only, i. e., broadly, the *Rhyngota*.

Of the *Thysanura* no list is given for lack of available material; but in all the other orders, the percentage of increase is fully up to the figure already mentioned.

With the increased knowledge gained from collections made in the ten years last past, I feel safe in predicting an equally great percentage of increase in the next decade, though it will not be so equally distributed. Any list in the *Thysanura* will be clear gain. In the *Ephemerida*, the *Plecoptera*, the *Corrodentia*, the *Platyptera*, the *Neuroptera* and the *Trichoptera* the list should be doubled. In the *Odonata* the additions will probably be very few, and this may be said of the *Orthoptera* as well. In the Hemipterous series there should be a large increase in both *Homoptera* and *Heteroptera*, since neither order has been at all thoroughly collected. This is particularly true of the smaller *Homoptera*, including the hosts of plant lice and leaf-hoppers. The *Coleoptera* will show a large percentage of increase in the families containing the smaller species.

The first edition enumerated 9 species of *Scydmaenidæ* and 13 species of *Pselaphidæ*. In the present edition there are 29 species of *Scydmaenidæ* and 67 of *Pselaphidæ*! This increase is entirely due to the fact that Mr. Wenzel has especially sought these little creatures, and when others devote their attention in like manner to certain other groups similar results may be expected.

In *Lepidoptera* few additions are to be expected among the butterflies or larger moths; but in the micros there will be a very great increase as our collectors appreciate the infinite variety and beauty of these little creatures.

In the *Hymenoptera* great additions are to be expected in the smaller parasitic types which have not been really collected at all. Indeed, except for the Aculeates taken in South Jersey by Mr. Fox, we have had no systematic collecting whatever, and our records are based on incidental or accidental captures.

So the *Diptera* may be expected to furnish a considerable percentage of increase, estimated by Mr. Johnson at 33 per cent. They have scarcely been taken even as accidentals by the majority of the collectors, and only Mr. Johnson has done systematic collecting in a few localities. Whole families are practically unrepresented, and in an order in which the species have a wide distribution New Jersey should have a majority of all those found in the Eastern United States.

The predictions made by me ten years ago have been justified: it is unlikely that I will be the one to point to the verification of those made in 1900.

INDEX TO LOCALITIES.

The general surface formation of the State is shown by the Relief Map of the Geological Survey, a reduced copy of which forms Fig. 1 of this list. A map showing the county lines and the chief towns as well as cities, forms Fig. 329, and on this the black dots show the location of colonies of the pernicious scale in 1898. By comparing the two maps the character of the territory for each general locality may be ascertained. Many of the collecting grounds are not of sufficient importance to find a place on a map so much reduced, hence it is desirable to indicate not only the county but also the nearest printed town. Where I have been able to do so, I have given a few words of general description.

Some of the most forbidding territory is often the richest from the standpoint of the Entomologist, and for almost all orders some locality especially suited may be found.

In response to my requests for the general character of their collecting grounds, each correspondent has dwelt upon his own especial point of view. The account sent me by Mr. C. W. Johnson is so well put and so characteristic of the localities described that I quote it in full :

"The most favorable collecting ground for *Diptera* is in the vicinity of water or moist ground. If in a wooded, mountainous section, along the edges of streams, woods or small openings in the woods, especially if caused by excessive moisture, as a spring, are ideal collecting grounds; such conditions are found in Warren county, along Dunnfield creek, a small stream flowing into the Delaware at the Water Gap. Similar conditions and collecting are to be found in the hills around Dover and Newark : at the latter locality my collecting in 1892 was chiefly confined to the vicinity of Belleville, along Second River."

"In the southern part of the State, three divisions might be recognized : the Delaware Valley, Pine barrens, and the Maritime. The first has an average width of about 15 miles, and is characterized by an admixture of species common to Pennsylvania and the northern part of the State, and which almost disappear in the pine barrens. Riverton and Westville are good localities, diversified by swamp, low and high ground, with patches of hard wood interspersed with groves of pine."

"In the pine barrens the *Bombyliidæ* are to be found in great abundance, several species being peculiar to that section. Clementon, Atco, Da Costa and Buena Vista are excellent collecting grounds with scrub-oak ridges, low pine land and sphagnum swamps. The sand-myrtle in May attracts numerous *Diptera*. This division covers the greater part of Southern New Jersey."

"The maritime consists of the salt water marshes and coast, characterized by the great abundance of *Culex*, *Tæniorhynchus*, *Tabanus nigrovittatus* and *Chrysops plangens*; while among the sand dunes the sand-colored *Stichopogon*

argenteus and *Laphystia sexfasciata* hold forth. Avalon, Anglesea and Cape May are excellent places for collecting."

"The three divisions referred to are best shown on a geological map: the first includes the alluvial soil of the river and the cretaceous marls; the second the tertiary sands and gravel, and the third the alluvial soil of the ocean and bay."

Mr. Wenzel writes, concerning his grounds: "The vicinity of Gloucester, Westville and Woodbury are practically the same. Several small creeks empty into the Delaware near these places, and at Westville, along the river front, is a fine sandy beach. The woods are deciduous, with an occasional patch of conifers, and very little old timber is found."

"Clementon, about 12 miles from Camden on the Atlantic City R. R., has a number of fine lakes with the usual aquatic plants. During the summer a great variety of flowers is found. The woods are deciduous and coniferous, with the old timber fast disappearing."

"Atco, about five miles further down the road, has almost the same growth, with a few cranberry bogs and a cedar swamp. The insect fauna seems to change here, as a number of species have been taken which are not recorded further west on the road."

"DaCosta, a flag station on the same road, about 30 miles from Camden and about half way to the ocean, is in the pine barrens, and here the scrub oak and scattering pines predominate. A number of southern and other interesting species have been found here, including the only known examples of *Dorcus brevis*. During the summer the heat is intense, no water is found near by and in a droughty season forest fires are numerous. In spring the season starts about two weeks later than at Camden."

The belt of laminated sand and clay marls to which Mr. Johnson has referred crosses the State diagonally from Trenton, on the Delaware, to the mouth of the Raritan river, a triangular extension east of that river reaching a few miles further north. The northern portion of this strip contains the potter and fire clays and sands. To the south and east it merges into the shore district.

Northwest of this is a broad belt of Triassic red sandstone, commonly known as the red shale, averaging about 20 miles in width, broadest on the Delaware, and this becomes hilly and irregular northwardly. It is broken by a line of trap forming the palisades and by the irregular though generally parallel ridges of the Orange or Watchung Mts., which are also of the Triassic trap. Sourland Mountain and some smaller ridges extend northeast from the Delaware, and all these ridges are shown on the relief map.

North of this comes a belt of Archæan, broken by ridges of limestone from the Silurian and Devonian series, and small points and narrow ridges of the Archæan series. Small areas of Hudson river slate and Silurian sandstone also occur, and a belt of Hudson river slate crosses the northwestern corner of the State parallel with the Delaware river to the New York line. This is bounded along its southeasterly margin by limestone, and is also interrupted by a broad limestone belt extending from the Delaware river two-thirds of the distance across the State. Then come in succession, parallel to the Delaware and within five miles of it, narrow belts of Oneida conglomerate, Medina sandstone, Oriskany sandstone and limestones. These formations all cross the State diagonally from the southwest to the northeast, and extend from the Delaware

river to the ocean, from the Delaware to the Hudson or from the Delaware to the New York State line and beyond. From the Water Gap the course of the Delaware river is northeast to Port Jervis, and the formations then run parallel to it.

The mountains are all in long ridges, the Kittatinny, which extends from the Water Gap, parallel to the river, into New York State, being scarcely broken in the 35 miles of its course in New Jersey.

In this mountain, near the northern corner of the State, is the highest point—1,808 feet.

All these matters come out much more clearly on the geological map of the State, but the few words of general explanation will serve to make more clear the relief map by referring the various regions and ridges to their proper formations.

The following localities are given in alphabetical order for convenience of reference, and it is believed that very few of those cited in the work are omitted :

Albion, Camden County, three and one-half miles west of Atco. Scrub and pine land, with pine and cedar swamps to the south.

Allaire, Monmouth County. In the pines just west of the marshy shore meadows, north of Lakewood, southeast of Freehold.

Alloway, Salem County. A good, well-cultivated country, with scrub pine and other woodland surroundings.

Almonessen, Camden County, a few miles southeast of Woodbury, on Almonessen Creek. Low, somewhat marshy and scrubby land, with a considerable pond near by.

Alpine, Bergen County, on the Hudson, about four miles south of the State line. Rocky, palisade, wooded country.

Ancora, Camden County, about three miles north of Winslow. In the pines, scrub and swamp, with cranberry bogs on the Pump branch, near by.

Andover, Sussex County, about five miles south of Newton. A hilly, wooded country, with extremes of a little over 700 feet ; small ponds near by, in all directions, filled by little brooks.

Anglesea, Cape May County. A fishing village on Five-Mile Beach, fronting the ocean just north of Cape May. From the beach the land rises and forms dunes half a mile back, where a heavy undergrowth with briars chokes a somewhat irregular wood of conifers and deciduous trees. This wood becomes larger, more open at Widwood and Holly Beach, some of the Hollies being large and very fine. In this wood are swamps densely filled with vegetation, and toward the mainland it merges rather abruptly into a salt marsh subject to flooding at high tides. The flora is very rich and so is the insect fauna which has been very thoroughly explored, almost all the New Jersey collectors having visited the place at some time. The Philadelphians make frequent journeys to this point, Messrs. Wenzel and Laurent having spent many days here. I have visited there myself, each year, one or more times, and have an especially fine lot of Orthoptera from this place.

- Arlington or Arlington Meadows, Essex County. A short distance east of Newark, at the edge of the Hackensack meadows, where most of the collecting was actually done.
- Asbury Park, Monmouth County. Means generally the ocean front and washed up material; but there is good collecting ground in the coniferous woodland behind the town, toward the mainland.
- Atco, Camden County. Scrub land; mostly conifers, light sandy soil, cedar and cranberry swamps.
- Atlantic City, Atlantic County. On an island made up of sand dunes, with reedy grasses rising from the ocean front to a central back-bone and dropping off at the west to a broad marsh which becomes flooded at unusually high water. Much of the collecting was done along the shore in times past of material washed up by the sea, and little has been done of late years.
- Atlantic County. Means usually the pine barrens.
- Atlantic Highlands, Monmouth County. A high ridge at the land end of Sandy Hook, overlooking the Ocean and Raritan Bay. Rolling scrub land with little high wood and much bush, merging into swampy meadows back of the ridge and along shore.
- Atsion, Burlington County. In the pines, surrounded by cranberry and cedar swamps, on Atsion Creek.
- Avalon, Cape May County. On the ocean front, south of Sea Isle City, and much like it in character.
- Barnegat, Ocean County. Strictly maritime, on the sandy point between the Ocean and Barnegat Bay.
- Bayside, Cape May County. On the Delaware Bay side of the Cape May peninsula, southwest of Cape May Court House. Pine and oak scrub land; beaches sand, gravel or mud.
- Bargaintown, Atlantic County. On the pond at the head of Patcong Creek, which empties into Great Egg Harbor near Somers Point. Pine barren, scrub and swamp land.
- Beach Haven, Ocean County. On Long Beach, fronting the ocean. A narrow, sandy island backed by tide marsh to Little Egg Harbor.
- Beesley's Point, Cape May County. On the south shore of Great Egg Harbor, opposite Somers Point. A low sand spit with tide marsh on either side.
- Belleville, Essex County. At the junction of the Passaic and Second River, just north of Newark, on rising land.
- Bellport, Long Island. A few species, chiefly saw-flies, are cited from this and other localities on Long Island by Dr. Dyar, where the food plant occurs in similar situations in New Jersey.
- Belmar, Monmouth County. On the coast, with the usual marsh and scrub back of the ocean sand dunes.
- Bergen, Hudson County. Probably refers to Bergen Point on the Kill von Kull, just opposite Staten Island, and on Newark Bay, opposite Elizabethport.

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- Bergen Hill, Middlesex County, about one mile from South Amboy in the brick and clay beds. It is questionable perhaps whether this locality was really intended by Hagen, and the chances are that Bergen Point, in Hudson County, was intended.
- Berlin and West Berlin, Camden County. About two and one-half miles northwest of Atco, at the edge of the pine and scrub land.
- Beverly, Burlington County. Well cultivated region, diversified, somewhat rolling light soils with patches of deciduous woodland.
- Blackwood, Camden County. On big Timber Creek, in swamp and pine land.
- Bloomfield, Essex County. In the rolling country at the base of the first ridge of the Orange Mountains; country well cultivated and most of the collecting done along the roads on the wooded slopes and in a few neglected fields.
- Boonton, Morris County. On the Rockaway River, in a hilly country varying from 400 to 900 feet elevation.
- Bordentown, Burlington County. On the Delaware River where there are swampy meadows along shore, rising rather abruptly, the country well settled and cultivated, with little, mostly deciduous, wood land.
- Bound Brook, Somerset County. About five miles northwest of New Brunswick, on the Raritan. At the base of rising ground over rolling fields through which the brook and one or two other little streams find their way into the river. Not much woodland.
- Branchville, Sussex County. Rough, hilly country, with deciduous woodland and rapid streams, locally forming ponds.
- Bridgeton, Cumberland County. On Cohansey Creek, where there is marsh and swamp, bordered by a level, well cultivated country about which is considerable scrub and woodland. A good collecting ground.
- Brigantine Beach, Atlantic County. A few miles north of Atlantic City and similar in character. Has a stretch of marshy meadow to the west and the usual sand dunes with reedy grasses toward the sea. Practically all the citations from this point are by the late Dr. John Hamilton.
- Bronx Park, New York City. A few species are cited from this locality, mainly by Dr. Dyar, where the food plant occurs in similar situations in New Jersey.
- Brookhaven, Long Island. See Bellport.
- Budd's Lake, Morris County. About one by one and one-half miles at extremes, four miles northeast of Hackettstown.
- Buena Vista, Cumberland County. Pine barrens, with scrub oak ridges and sphagnum swamps. Mr. Liebeck has been the chief collector here so far as records go. About five and one-half miles north of Vineland.
- Burlington, Burlington County. Varies from swampy meadows along the the river and creek to alluvial levels, well cultivated and with only scattered small patches of deciduous woodland.
- Burlington County. Rather indefinite, but usually means the pine barrens.
- Caldwell, Essex County. Lies west of Montclair beyond the second ridge of the Orange Mountains, in a broken, hilly country, with considerable woodland of deciduous trees.

Camden, Camden County. Most of the species so cited came from the marshes or low lands along the Delaware and Coopers Creek.

Camden County. Covers a great range of territory from the river valley to the pine barrens. Most of the species so cited are probably nearer to Atco than to Camden.

Cape May, Cape May County, the southernmost point in the State. Seashore, marsh, mud flats and sand dunes, with a backing of scrub, sweet bay, beach plum and the like.

Cape May Court House, Cape May County. Pine and scrub-land, with dense thorny underbrush and some swamp land.

Carlstadt, Bergen County. At the edge of the Hackensack meadows, about two miles southeast of Passaic.

Cedar Lake, Warren County. About a mile from Blairstown, at an elevation of about 350 feet.

Central Park, New York City : see Bronx Park.

Chester, Morris County. A hilly country with deciduous woodland and rapid brooks, Schooleys Mountain a few miles to the west.

Chimney Rock, Somerset County. An abrupt cliff, about 400 feet, overlooking Middle Brook, about three miles east of Somerville.

Clayton, Gloucester County, about three miles south of Glassboro ; in the pine and scrub oak country.

Clementon, Camden County, twelve miles southeast of Camden. See general description.

Clifton, Passaic County, between Paterson and Passaic. Meadow with little clumps of wood land, most of the collecting done along Weasel brook. Now almost all built over.

Corsons Inlet, Cape May County. At the north point of the narrow island on which Sea Isle City is located and much the same country.

Collingwood, Camden County. About four miles southeast from Camden. A well cultivated country with scattered, mostly deciduous woodland.

Cologne, Atlantic County : a few miles southeast of Egg Harbor. Pine barrens and scrub land, with cedar swamps.

Communipaw, Hudson County. Southern end of Jersey City.

Cramer Hill, Camden County, near Camden City. Deciduous woodland to the river bank meadows

Culvers Pond, Sussex County. One and three-quarter miles northwest of Branchville, at base of Kittatinny Mountains, elevation 850 feet.

Cumberland County ; means generally the pine barren region.

Cranberry bogs. Species so cited were, with rare exceptions, taken by me, late in May, when the bogs were reflowed, forcing the insects out of their retreats, the wind driving them into one corner where they were collected in great numbers.

Da Costa, Atlantic County. In the pines ; light sandy soil, with scrub oak land and coniferous woods, much ravaged by fire.

- Delaware Water Gap**, Warren County. This locality means the shore of the Delaware, opposite the Pennsylvania town of that name, extending along the base of the mountains on the New Jersey side and along the carriage and railroad in both directions. The country is rocky and broken, with plenty of water in ordinary seasons and numerous flowers, *Ceanothus*, *Spiraea*, etc. Several collectors have cited the place, but more species have been taken by Mr. C. W. Johnson than any one else. My own collections here are very limited in extent.
- Dover**, Morris County. A hilly country with wooded slopes and valleys, in which are more or less rapid brooks. A good country for collecting.
- Dunker Pond**, Passaic County, about six miles a little south of east of Franklin ; elevation a little over 1,000 feet.
- Dunellen**, Union County. At the base of the Orange Mountains, west of Plainfield ; a good rolling country, rising to the north with swamp, brooks and woodland in the vicinity.
- Dunnfield**, Warren County : most generally cited with the Delaware Water Gap. The collecting here was all done along the line of Dunnfield Creek and along the sides of Mt. Tammany, in the open glades and along the rocky banks and bed of the creek. Mr. Johnson has given most of the citations here.
- Eagle Rock**. A prominent point on the first ridge of the Orange Mountains, west of Montclair, Essex County ; well wooded in the vicinity.
- Echo Lake**, Passaic County = Macopin Lake : q. v.
- Egg Harbor City**, Atlantic County. Gravelly and a little rolling to the north, sandy and more level to the south : much fruit and vineyards, but also much pine and scrub land, with the usual admixture of swamp vegetation.
- Eldora**, Cape May County. Ten miles northwest from Cape May C. H. ; ten miles southwest from Tuckahoe ; at the edge of the pines, tending toward the Bay Shore marshes.
- Elizabeth**, Union County. Marshy meadowland toward the shore and along it ; cultivated, and ridges to the north and west, with low, mostly deciduous woodland.
- Englewood**, Bergen County. On the west slope of the Palisades. Several small creeks in the vicinity, forming ponds.
- Englishtown**, Monmouth County, four miles northwest of Freehold. Rather hilly or rolling, with deciduous and some coniferous woodland.
- Fairmount Cemetery**. On the banks of the Hackensack, Bergen County, near Hackensack.
- Farmingdale**, Monmouth County, about seven miles southeast of Freehold. A flat, scrubby country, with two small streams near by, along which are cranberry bogs.
- Flatbush**, Long Island ; several times cited for species whose occurrence in New Jersey is practically certain.
- Forest Hill**, Essex County. On the Second River, just north of Newark. Hemlocks mostly, with a sprinkling of oak, chestnut and beech.

Formosa Bog, Cape May County. Three miles south of Tuckahoe, on a branch of the Cedar Swamp Creek. In the pine barrens.

Fort Lee, Bergen County. Means usually the base or wooded slopes of the Palisades at that point. The country is rough and stony, the forests are deciduous.

Freehold, Monmouth County. In the midst of a rich, almost level, well cultivated country; some deciduous and evergreen woodland to the west.

Frenchtown, Hunterdon County. On the Delaware river, the land rising to elevations of 400 feet within a mile or two to the eastward.

G. d. Generally distributed: means that the species has been found in so many places and so often that the conclusion is fair that it occurs wherever the food conditions are favorable. Cited by a Philadelphia man it means the lines between Camden and Atlantic City or those between Camden and Cape May. Cited by a Newark man it is equivalent to "Newark district." To a New York collector it means the range between Greenville and Fort Lee. Cited by me it means the State at large.

Gibbs Hill Pond, Salem County. Four and one-half miles southwest of Alloway, in the pine scrub land. Elevation twenty-two feet.

Glassboro, Gloucester County. In the pine district, with scrub oak fields and small swamps, interspersed.

Gloucester, Camden County: see introductory remarks.

Greenville, Hudson County. On the narrow neck of highland just south of Jersey City, between Newark and New York Bays. Almost all laid out in building lots at present.

Greenwich, Cumberland County. On Cohansey Creek. Mostly low land, which becomes marshy along the creeks and brooks near by.

Greenwood Lake, Passaic County. A long narrow sheet of water between two parallel ridges, extending into New York State. The ground is rough and broken, the sides of the hills well wooded in most places. Several of the recorders have collected here, though Mr. Beutenmuller cites this point most frequently.

Grenloch, Camden County, two miles south of Blackwood.

Good Intent, Gloucester County, just west of Blackwood. On the south branch of Timber Creek which widens into ponds to the south.

Guttenberg, Hudson County. On the Palisades, about three miles north of Hoboken. Most of the collecting was done at the banks of the Hudson or on the wooded slopes.

Hackensack Meadows, Hudson and Bergen Counties. A great stretch of marsh land between the Palisades and the rising ground, separating the Hackensack from the Passaic river. Gay in fall with acres of mallow.

Hackettstown, Warren County. On the Musconetcong river at an elevation of about 500 feet, rising within a mile or two to 1,000 feet or more, slopes with deciduous woodland.

Haddonfield, Camden County. A rich, well cultivated district, with little, mostly deciduous, woodland, usually well elevated.

- Hamilton, Somerset County. On the P. & R. R. R., about two miles west of Millstone. Level or rolling, well cultivated country.
- Hammonton, Atlantic County. Large area in fruits, large and small, scrubland surrounding the cultivated area. Woodland, both deciduous and evergreen, of considerable extent, and swamps giving rise to small streams. Some territory in cranberries.
- Harris Hill Pond, Cumberland County. Six miles northwest of Bridgeton, in pine and scrub land. Elevation fifty feet.
- Hemlock Falls, Essex County. Lies west of South Orange, beyond the crest of the first ridge. The country is rough, pretty well wooded, a small stream forming rapids in a rather deep gully: some swampy ground in the hollows. A favorite collecting ground for the Newark entomologists.
- High Bridge, Hunterdon County. On the south branch of the Passaic river, rising to elevations above 400 feet; slopes wooded.
- Highlands. See Atlantic Highlands.
- Hightstown, Mercer County. Light soil, well cultivated, with scattered deciduous and some coniferous woodland: looks toward the pines.
- Hoboken, Hudson County. On the Hudson. Collecting grounds are west of the city in the marsh or swamp, and at the base of the high ground on which part of the city is built: this locality and Jersey City Heights merge into each other.
- Holly Beach, Cape May County. Similar to Anglesea, with a considerable grove of large Holly trees on the ridge.
- Homestead, Hudson County: at the edge of the low meadow west of West Hoboken.
- Hopatcong, Morris County: also cited as Lake Hopatcong. Between Sparta and Green Pond Mountains, elevation over 900 feet. A rough, stony, more or less wooded country, in which several entomologists have collected. Mr. Palm making the most numerous contribution in the Coleoptera only.
- Hudson County. Rather indefinite, but means mostly the base of the high ground back of Jersey City and Hoboken and Snake hill. This term is used only by Mr. Linell, and may extend north to Weehawken.
- Hunterdon County. A rolling or hilly, sometimes rocky country, fairly well watered, with deciduous wood land and occasional groves of coniferous trees: rarely cited.
- Indian Creek, Atlantic County. About four miles north of Egg Harbor City, in pine and scrub land.
- Iona, Cumberland County. Seven miles south of Glassboro and in the same general region.
- Irvington, Essex County. On the rising ground west of Newark, country mostly under cultivation and the majority of species cited from here are of economic interest.
- Jamesburg, Monmouth County. The collecting ground is on the line of the railroad to Old Bridge, around a series of cranberry bogs covering about

100 acres. There are groves of conifers as well as deciduous trees and much swamp land above and below the bogs. Ditches of considerable size regulate the water supply for the bogs. This is a meeting ground for the entomologists of New York, Newark and Philadelphia on their 4th of July outings; so most of the contributors to the list include species from Jamesburg.

Jersey City Heights, Hudson County. Refers to the west slope of the ridge back of Jersey City and Hoboken, extending down to the meadows.

Kirkwood, Camden County. Four miles southeast of Haddonfield, on Coopers Creek, with a considerable pond close by. At the edge of the scrub land.

Lahaway, Ocean County. At the head of Lahaway Creek; nearest post-office is Prospertown; nearest town, New Egypt. The collecting ground is a basin, some thirty acres of which is in cranberries, ground rising on three sides. Surface soil sandy, mixed with clay. Pines on all sides, many deciduous trees. Huckleberry swamp partly edging bogs, in which are many magnolias. Flora very rich. Have taken a very large number of species of all orders, and many more have been taken by my good friend J. Turner Brakely.

Lakewood, Ocean County. In the pine district but with more old open forest and less scrub land than usual. The ordinary South Jersey sand is here, and a small lake (pond) gives variety to the flat landscape.

Landisville, Cumberland County. Five miles northeast of Vineland, in the pine barrens.

Laurel Springs, Camden County, about five miles south of Haddonfield. Low wood and shrub land, similar to Clementon.

Lenola, Burlington County, about one and one-half miles west of Moorestown, in similar country.

Linden, Union County, between Elizabeth and Rahway, on the Pennsylvania Railroad. Rolling country with low, deciduous woodland.

Lindenwold, Camden County, about five miles southeast of Haddonfield: similar to Berlin.

Little Falls, Passaic County, about one and one-half miles southeast of Paterson, on the Passaic River.

Little Silver, Monmouth County. Near the shore a level sandy country with little, low, mostly deciduous woodland.

Long Branch, Monmouth County. A narrow gravelly and sandy beach, backed by an abrupt highland, behind which is a good, well cultivated country: a little deciduous woodland.

Long Island. Some species from this place are cited, where the territory in which they were collected resembles that on the Jersey coast.

Longport, Atlantic County. On the shore south of and similar to Atlantic City.

Lucaston, Camden County, seven miles southeast from Haddonfield, on the W. J. and Seashore R. R.: similar to Berlin.

Lyons Farms, Union County, between Newark and Elizabeth. A well-farmed country with some deciduous woodland.

- Macopin Lake**, Passaic County, ten miles north of Boonton, at western base of Kanouse Mt., 893 feet above sea level.
- Madison**, Morris County, fourteen miles southeast of Morristown. Hilly, well wooded locally, much under cultivation. Trees mainly deciduous.
- Manahawken**, Ocean County, four and a half miles south of Barnegat. Belongs to the maritime district, with swamp and scrub land back from the sand dunes and reedy grasses. Quite a large pond.
- Manasquan**, Monmouth County. On the coast at the junction of pine barren and maritime district.
- Manchester**, Ocean County. In the pines, eight miles southwest of Lakewood. Much swamp land near, some of it in cranberry bogs. Scrub oaks and pines predominate and the soil is mostly sandy. Messrs. Davis and Leng have collected here.
- Maplewood**, Essex County, about four miles west of Newark, on the south branch of the Rockaway River, elevation about 200 feet and rising in wooded slopes to the north.
- Marlton**, Burlington County, six miles east of Haddonfield. Among gravel and marl beds, with scrubby deciduous and coniferous woodland.
- Masonville**, Burlington County, four and one-half miles west of Mt. Holly. Level to the lowlands of Masons Creek, on which is a pond of considerable size : low deciduous and coniferous woodland.
- Mays Landing**, Atlantic County. Scrub and pine barrens, sand and swamps : an excellent collecting ground.
- Merchantville**, Camden County. four miles west of Camden. Deciduous woodland and somewhat rolling, with well cultivated farms and much fruit close by.
- Middlesex County**. Indefinite and rarely cited : it means usually the country a little to the south of New Brunswick.
- Milburn**, Essex County, six miles westerly from Newark, on the D. L. and W. R. R. A pretty, broken country, with a swift little brook in a rather deep valley, with shrubby sides. Country round about rather well cultivated.
- Milford**, Hunterdon County, four miles northwest of Frenchtown, on the Delaware river. Hills with slopes of deciduous woods to the north and east.
- Millville**, Cumberland County. Scrub oak and pine barrens, with low meadows along the Maurice river.
- Millstone**, Somerset County. on the Millstone river, rising to a gently rolling plain, well cultivated and with scattered deciduous woodland.
- Monmouth County**. Rarely cited, and may mean anything from sea-shore to pine barrens.
- Monmouth Junction**, Middlesex County. Ten miles southeast from New Brunswick ; swampy woods and low meadow. Trees mostly deciduous but much evergreen about.
- Moorestown**, Burlington County. On a fertile ridge, with low plains north and south, well cultivated country, with scattered patches of mostly deciduous woodland.

- Morris County. Rarely cited: hilly or mountainous, often rough, well watered country, with deciduous and some coniferous forests.
- Morris Plains, Morris County, about two miles north of Morristown. A plateau of about 425 feet rising to the north, east and west to hills of 600 feet or over. Slopes with deciduous woods.
- Morristown, Morris County. Low hills with wooded slopes and running streams; well cultivated, with considerable deciduous woodland.
- Mount Holly, Burlington County. On Rancocas Creek. Ranging from shore meadows to a considerable hill—the highest land in this part of the State. Generally well cultivated with some deciduous and coniferous woodland.
- Mt. Pleasant, Cape May County, five miles south of Tuckahoe. Elevation thirty feet: in the pine barrens.
- Mullica Hill, Gloucester County. Well cultivated, though light, rolling land with low, mostly deciduous woodland, some swamp along the course of Raccoon Creek.
- Netherwood, Union County, about one mile northeast of Plainfield and similar in character.
- Newark, Essex County. An unsatisfactory locality, including as it does the range from marsh forms at the south and east to hill types at the north and west. This term means nothing uniform or definite except the geographical district.
- Newark district. When this term is used it means that the species occurs in all the various kinds of localities about Newark.
- New Brunswick, Middlesex County. At the edge of the red shale, which dips below the sand and clay a little to the south. Most of the species cited were collected by me in the immediate vicinity of the city. A very little collecting has been done on the banks of the Raritan.
- Newfoundland, Morris County. In the mountains between Green Pond and Macopin Lake, elevation about 750 feet; nine miles southeast of Franklin furnace.
- “New Jersey.” Some species are so cited because the specimens are so marked in the collections. They are relics of the period when State labels were considered all-sufficient, and usually they are rare forms. Occasionally, also, the actual locality becomes a little uncertain, though it is positive that the insect has been taken in the State.
- Normanock, Sussex County. At Culver's Gap, in the Kittatinny Mts., three miles northwest of Branchville.
- Nutley, Essex County. On the Erie R. R., between Newark and Paterson, west side of Passaic River.
- Nyack, New York. A few miles north of the New Jersey line, on the Hugson. The fauna is the same for several miles north and south of this point.
- Ocean Beach, Monmouth County. On the shore, one mile north of Spring Lake: the usual maritime conditions.
- Ocean City, Atlantic County. On the sea-coast, with the usual salt marshes, toward Egg Harbor bay.

- Ocean County.** Rather an indefinite locality, but means usually either Lakewood or Lahaway; both of them in the pines, so that the general character of the territory is the same.
- Ocean Grove, Monmouth County.** Adjoining and similar to Asbury Park, save that it has more woodland.
- Ocean View, Cape May County.** On the mainland, three miles northwest of Sea Isle City, just above the marsh land and at the beginning of the pine barrens.
- Orange, Essex County.** A somewhat indefinite locality, as generally used, but means usually the rising ground at the base of the first ridge of the Orange Mts., where there is vegetation in great variety and much cultivated land, but also a few wooded patches and slopes. The forest trees are deciduous.
- Orange Mts., = Watchung Mts.** A somewhat indefinite term, but means generally the first range of hills back of South Orange and extending toward Montclair. The country is hilly, broken, quite well wooded and with many small brooks and streams. All the Newark collectors range in this territory.
- Palisades.** Refers usually to the vicinity of Fort Lee, north and south.
- Pamrapo, Hudson County.** On the New York Bay slope of the narrow peninsula, three miles south of Jersey City.
- Passaic, Passaic County.** At the edge of the meadows, with marsh and swamp land; rising ground to the north.
- Patcong Creek, Atlantic County.** About five miles long, runs south and west from a little pond into Great Egg Harbor just west of Somers Point, through pine and swamp land.
- Paterson, Passaic County,** at the falls of the Passaic River, a broken, rocky country, with some deciduous woodland and rocky river shores with occasional sand banks.
- Pelham Manor**—see Bronx Park.
- Penns Grove, Salem County,** on the Delaware River, opposite Wilmington.
- Perth Amboy, Middlesex County.** At the head of Raritan bay. Sand and clay rising somewhat to the north, swampy, flats along the river, scrub land with little larger timber, conifers and deciduous, to the south and west.
- Petersburg, Cape May County,** three miles southeast of Tuckahoe, in the pines, near Cedar swamp creek.
- Philadelphia.** Some species collected near this city are cited where their general distribution is such that their occurrence in the Delaware River Valley is almost certain.
- Philadelphia neck.** The low marshy meadows near the Delaware, south of the city. The species collected here will almost certainly occur in similar situations on the New Jersey side.
- Plainfield, Union County.** On the rolling plain at the base of the Orange Mountains, ground rising to the north and becoming stony and wooded at the hills, between which are small streams.

- Pleasant Mills, Atlantic County, eight miles north of Egg Harbor City, on the Mullica River, among a net work of creeks and ponds in the pine barrens.
- Pleasantville, Atlantic County, on the mainland, five miles northwest of Atlantic City, at the edge of the broad marsh separating it from the shore.
- Point Breeze, given by Say as the type locality for *Bellamira scalaris*. The nearest approach to this locality is "Sea Breeze," Salem County, on Delaware Bay four and a half miles south of Greenwich.
- Point Pleasant, Ocean County. On the shore, at the mouth of the Manasquan River, with the usual salt marsh, sand dunes and other maritime characters.
- Port Norris, Cumberland County, near the mouth of the Maurice River. Between the pine barrens and the coast marshes
- Port Republic, Atlantic County, six miles east of Egg Harbor City, on Nacote Creek, which widens here into considerable ponds. Scrub and swamp land.
- Princeton, Mercer County. On the red shale, land well cultivated, with considerable low, deciduous woodland in the vicinity.
- Prosperstown, Monmouth County, five and a half miles northeast of New Egypt, just across the Ocean County line. Pine barrens.
- Quick Pond, Sussex County, among the mountains, five and a half miles west of Branchville, at an elevation of 950 feet.
- Quinton, Salem County, three miles west of Alloway on the Alloway river, good cultivated level land with little, deciduous wood.
- Raccoon Creek, Gloucester Co., empties into the Delaware about eighteen miles below Camden. Swedesboro and Mullica Hill are on it
- Ramapo Mts., Passaic County, about three miles east of Ringwood, extending into New York, elevation about 1,100 feet. Slopes well wooded.
- Rancocas, Burlington County, about five miles south of Beverly; marshy meadows along Rancocas Creek, rising abruptly to wooded upland: a well cultivated country.
- Ridgewood, Bergen County, three miles northeast of Paterson. A hilly and rolling country with much woodland and rapid brooks in the rocky valleys and gullies.
- River Edge, Bergen County, at the edge of the Hackensack river, about three miles north of Hackensack. Hilly on each side, rising to 300 feet on the west, deciduous woodland
- Riverside, Burlington County, on Rancocas Creek, at its junction with the Delaware. Low ground along the creek with the usual low meadows, scrub and woodland to the west and south.
- Riverside Drive, New York City: see Bronx Park.
- Riverton, Burlington County, nine miles southeast from Camden, on the Delaware. Diversified by swamp, low and high ground with patches of hard wood interspersed with groves of pine.
- Roselle, Union County, a few miles northwest of Elizabeth, in a rolling, partly wooded country, with deciduous trees and running brooks.

- Rutherford, Passaic County, on the Passaic River just south of Passaic, at the foot of the ridge between the river and the Hackensack meadows.
- Salem, Salem County. On Salem Creek, near the Delaware River. There is much mud and marsh along the creek, rising only slightly into an alluvial plain on which is a little deciduous woodland.
- Sandy Hook, Monmouth County. A narrow tongue of sand separating the ocean from direct sweep into Raritan Bay. Was an excellent collecting ground some years ago; but now shut off by the U. S. Government which has fortified it.
- Schooley's Mountain. At the western border of Morris County; a chain about twelve miles in length of peaks of from 1,000 to 1,200 feet: with much deciduous woodland and plenty of water.
- Schwartswood Lake = Swartswood Lake: q. v.
- Sea Cliff, Long Island: see Bellport.
- Sea Girt, Monmouth County, about a mile south of Spring Lake. The usual low meadow back of the strictly shore formation.
- Sea Isle City, Cape May County. On the coast, a sandy beach with the usual dunes and backed by the usual salt marsh and mud flats of considerable extent.
- Sea-shore: a general term that may mean any point between Sandy Hook and Cape May and may mean them all: in most instances, perhaps, Atlantic City and southward is intended.
- Seaville, Cape May County. On the main land three and one-half miles north of Sea Isle City, at the junction of the pine barrens with the low land merging into the salt marsh.
- Seven Mile Beach, Cape May County. A long narrow island fronting the ocean, between those on which Sea Isle City and Holly Beach are situated.
- Shark River, Monmouth County, forms a large lake which opens into the ocean by a narrow inlet at Belmar, rising on each side to meadow and woodland.
- Shiloh, Cumberland County. Four miles northwest of Bridgeton, level, light soil, with partly deciduous though scrubby woodland.
- Short Hills, Essex County, seven miles west of Newark, among small hills, with deciduous woodland and small stony brooks.
- Shrewsbury, Monmouth County. Two miles south of Red Bank, low meadows and flat, deciduous and coniferous woodland.
- Smithville, Burlington County, two miles east of Mt. Holly, on Rancocas Creek. Good cultivated land above the marshy meadows.
- Snake Hill, Hudson County. A rather large wooded hill rising abruptly from the midst of the Hackensack meadows west of Hoboken. The base of this hill is a refuge for great numbers of swamp inhabitants that hibernate there, and many collectors from New York, Jersey City and Newark have filled their boxes and bottles in early spring from the material gathered beneath the stones and among the rubbish.
- Somers Point, Atlantic County, on Egg Harbor bay. The usual maritime character, backed by scrub and pine land.

- South Amboy, Middlesex County. Marsh and scrub-land, sandy, but with gravelly hills wooded with evergreen and deciduous, low, scrub-like trees and bushes. Offers quite diverse collecting grounds.
- South Jersey. Means usually the pine barrens and maritime region, embracing roughly the territory south of the West Jersey and Seashore R. R.
- South River, Middlesex County. Means the territory between Milltown and South river along the line of the trolley and usually the swampy woodland.
- Sparta, Sussex County. On the Walkkill river, elevation about 650 feet, rising on all sides, four miles northeast from the head of Lake Hopatcong.
- Spotswood, Middlesex County. A little northeast of Jamesburg and much like it in general character, except that there is not so much woodland.
- Spring Lake, Monmouth County. Belongs to the maritime district ; diversified with swamp, lake, marsh and scrub land ; some pine and deciduous trees.
- Staten Island, Richmond County, New York. Belongs geographically to New Jersey, forming the northern and western shores of Raritan bay. The country is varied, and the locality as cited gives no clue as to the character of the surroundings where the species was taken.
- Suffern, New York. Just across the State line on the Erie R. R. A hilly stony country with wooded slopes and rapid streams in the valleys. Some of the New York entomologists have collected here, their excursions not infrequently extending across the State boundary, where the fauna is exactly similar.
- Summit, Union County. Well up in the Orange Mountains, with deciduous woodland and plenty of small streams in the valleys and gullies.
- Swartswood Lake, Sussex County, four miles westerly from Newton. Elevation 480, rising from all sides in slopes covered with wood land and cut with rocky streams.
- Swedesboro, Gloucester County. Well cultivated truck and fruit land, level or slightly rolling with a little swamp to the northwest and a little deciduous woodland.
- Swinefield Bridge, Morris County. On the Passaic River, at the edge of the Hatfield Swamp, about ten miles northwest from Newark.
- Tenafly, Bergen County. On the west slope of the Palisades, about two miles north of Englewood.
- Three States Point. At the end of a narrow spit of land extending into the Delaware just south of Port Jervis ; practically the junction of N. Y., N. J., and Penn.
- Timber Creek, empties into the Delaware, about five miles south of Camden, and forms part of the division between Camden and Gloucester Counties : mostly with low, marshy banks.
- Toms River, Ocean County ; a short distance west from Barnegat Bay. Sand and scrub land with occasional taller wood land, marshy along the river

course, locally swampy, some land in cranberries, increasing toward Island Heights. Ideal country for dragon flies and the mosquitoes that they feed upon.

Trenton, Mercer County, on the Delaware. Most of the collecting was done in the outskirts of the city.

Tuckahoe, Cape May County. On the Tuckahoe river at the point where the pine and scrub land begins to merge into salt marsh.

Tuckerton, Ocean County. At the head of Tuckerton creek, across which is Burlington County. A mixture of bog, swamp, pine barrens and salt marshes within a short distance.

Van Cortland Park, New York City : see Bronx Park.

Verona, Essex County, about one and one-half miles northwest of Montclair, on the first ridge of the Orange Mts., about 500 feet ; quite some deciduous woodland.

Vincentown, Burlington County. About five miles southeast of Mt. Holly, at the head of the south branch of Rancocas Creek, with quite a large pond : good, level, cultivated land.

Vineland, Cumberland County. A level, fairly well cultivated district, with surrounding rather tall scrub-land and pine groves. Hardly in but near to the pine barren type.

Watchung Mts. : see Orange Mts.

Weehawken, Hudson County. On the Hudson, at the base of the Palisades, above Hoboken. Once an excellent and much frequented locality.

Wenonah, Gloucester County, three miles south of Woodbury, and much like it in character.

West Bergen, Hudson County. Means the Newark Bay side of Bergen Point, q. v.

West Creek Pond. About three miles northeast of Tuckerton and very similar in character of surroundings.

Westville, Gloucester County, between Gloucester and Woodbury. Diversified by swamp, low and high land, with patches of hard wood interspersed with groves of pine.

Whitings, Ocean County. Pine barrens, scrub, oak, sphagnum and cedar swamps.

Wildwood, Cape May County. On Five Mile Beach, near Holly Beach, resembling Anglesea in general character.

Williamstown, Gloucester County. Pine and scrub land, with swamp and bogs along the creeks to the east and south.

Woodbine, Cape May County, five miles southeast of Tuckahoe. Pine and scrub land, sandy barrens and swamps : withal a rich collecting ground.

Woodbridge, Middlesex County. About three miles north of Perth Amboy, almost at the edge of the clay and sand formations ; but yet well on it.

Woodbury, Camden County. Good, well cultivated land, with a little swamp and scattered patches of deciduous woodland.

Woodland Cemetery, Essex County. A field of underbrush of willow, cherry, oak, beech and hickory : no trees. Within Newark city limits.

Woodside, Essex County. . On the south side of Second River, at its junction with the Passaic : is practically the northeast section of Newark city.

Woodstown, Salem County. A light but good soil, the district well cultivated and only occasional patches of mixed deciduous and coniferous woodland.

Explanations of Abbreviations and Acknowledgments.

A E S American Entomological Society: Philadelphia. This means that New Jersey specimens are in the society collection, usually with a State label only. The society now possesses, among others, the collections of the late Dr. George H. Horn and of the late Messrs. Wilt & Martindale. The collection of Mr. E. T. Cresson is also stored in its rooms, and there is considerable material from older sources, including quite a number of types. I have looked carefully over the collections in *Hymenoptera*, and Dr. Calvert cites those in the *Odonata* in several instances.

Ang. Angelman, John B., Newark. Collects macro-lepidoptera, and has furnished some of the records credited to the Newark society. Mr. Angelman's collections have been largely made within a few miles of Newark, ranging from the salt meadows to the Orange Mountains: a large portion of his material in the moths has been determined by myself, while much of the balance has been compared with authoritatively determined collections.

Ashm. or **Ash.** Ashmead, William H., Washington, D. C.; Assistant Curator of insects in the United States National Museum. Mr. Ashmead is our leading authority in the Hymenoptera, and the list in that order has been compiled by him from data furnished by collectors and contributors generally, from material in his own collection and from the collections in the United States National Museum. All my own species, except in the Aculeates, have been determined by Mr. Ashmead, as have also the species collected by some others.

Furthermore, Mr. Ashmead has determined many of the Hemiptera-Heteroptera, not only for me but for others that have collected in New Jersey. The list, therefore, owes him much in two orders.

Banks, Nathan, Falls Church, Virginia; Assistant in the Division of Entomology, U. S. Department of Agriculture. Is a specialist in the neuropterous orders and has named or determined not only all my material, but that of other collectors who sent him their New Jersey specimens. I have used Mr. Banks' Catalogue of Neuroptera as a guide in this list; but have given the divisions ordinal rather than family rank.

Beyer, G., New York City. Coleopterist, and has sent me records chiefly from the northern section of the State.

Bf. Bischoff, E. A., Newark. Mr. Bischoff is an enthusiastic collector of Coleoptera, and his records are numerous and usually accurate. His collecting grounds are chiefly the environs of Newark; but this embraces territory like the marshy districts lying east and south, and the hilly country lying west and north along the first ridge of the Orange Moun-

tains. The locality "Orange Mts.," which occurs so frequently in Mr. Bischoff's records, usually means the ridge west of South Orange, the vicinity of Hemlock falls and in the direction of Eagle Rock. Most of Mr. Bischoff's collection has been seen by me; many of the species have been determined by me and others have been named by Messrs. Wenzel and Liebeck.

Bird, H., Rye, New York. Collects Lepidoptera and makes a special study of boring larvæ. His notes are chiefly in *Hydræcia*.

Boerner, Chas., Philadelphia. Is a coleopterist, and has taken many good species in New Jersey. South Jersey is his stamping ground and his material has been, in the main, named by Mr. Wenzel.

Brakeley, J. Turner, Bordentown. An enthusiastic amateur and owner of the Lahaway Cranberry plantations, whence I have received a very large number of specimens from him. He is the originator of the plaster cast method of studying underground insects.

Brehme, H. H., Newark. Collects and breeds *Lepidoptera*, confining himself mainly to the Papiliones, Sphinges and the larger Bombyces. To Mr. Brehme I owe a very useful list of food plants and dates of the occurrence of the early stages in the families studied, as well as the number of broods noted. Mr. Brehme's collections have been chiefly made in the environs of Newark and in the Orange Mountains.

Bruner, Lawrence, Lincoln, Nebraska, Professor at the State University; specialist in the Orthoptera. Prof. Bruner has determined most of the material collected by me, and has revised the manuscript of the list in the Orthoptera, which may therefore be taken as representing the present arrangement of most of the groups. Quite a number of species are added on Prof. Bruner's authority, and, altogether, the list makes a very fair showing in this order.

Bt. Beutenmuller, William. Curator of Insects in the American Museum of Natural History. Mr. Beutenmuller has supplied records in several orders, and in Coleoptera and Lepidoptera, especially the latter, has supplied many data concerning early stages, food habits, &c. He has published several lists of species of various groups found near New York, and these have been freely used. His chief collecting ground in New Jersey has been the district near Fort Lee, along the foot of the Palisades, on their wooded slopes and often on their summit. Greenwood Lake and Lake Hopatcong have also been visited on entomological excursions.

Buckman, Fred, Newark. Coleopterist and member of the Newark Society.

Bwl. Broadwell, W. H., Newark. A lepidopterist with a small, chiefly local collection, but well kept and accurately dated. Some of the material has been collected in the more northern parts of the State, and a large proportion of it has been seen and determined by me.

C. Calvert, Dr. Philip P., Philadelphia. Professor in the University of Pennsylvania and specialist in the order Odonata. Dr. Calvert has not only prepared the list in that order, but has also furnished a very large proportion of the records. Furthermore, he has determined all my material

and almost all of that credited to other collections in the list. This order, then, is probably as complete and accurate as any other in the work.

- Carney**, John P. R., Camden. A collector of diurnal Lepidoptera who has sent me a list of his captures in parts of Camden and Burlington Counties between 1867 and 1899. Some of these records are extremely interesting, and, as the material has been seen by Dr. Skinner, the determinations may be considered reliable.
- Castle**, Dr. D. M., Philadelphia. Has furnished a number of good records in Coleoptera, many of them of species not found in recent years.
- Ch.** Chittenden, F. H., Assistant in the Division of Entomology, U. S. Department of Agriculture. A coleopterist, specially interested in life habits and development. Mr. Chittenden has collected at Orange and there are a few records from other localities; but his most important contributions to the list are the notes on the food habits which are found throughout the Coleoptera, chiefly in the Phytophaga and in those series containing species that attack stored products.
- Ckll.** or **Cockerell**, T. D. A., Mesilla Park, New Mexico. Professor Cockerell has contributed notes on some of the bees sent him from New Jersey and also on certain groups of scale insects. The arrangement of the armored scales is, in general, in accord with Prof. Cockerell's papers on the group.
- Clem.** Clemens, Brackenridge. A writer on micro-lepidoptera, cited by Dr. Dietz from published records only.
- Cr.** Crane, Marcus S., Caldwell. Mr. Crane is a general collector of many years' standing who has accumulated a large lot of material of all orders, principally taken near Caldwell. Mr. Crane has worked up much of his material himself, especially in the better known orders, but much of it has also been submitted to specialists. Mr. Crane's records are of unusual value from the fact that in some orders no one else has collected in that general district.
- Cress.** Cresson, Ezra T. Well known as an authority in Hymenoptera. His collection, including many types, is in the rooms of the American Entomological Society, and it contains many New Jersey specimens, usually with a State label only. These are credited to "Cress Coll." Mr. Cresson has published a catalogue of the Hymenoptera, giving among other things the geographical distribution, and to this list reference is had when only "Cress" follows a record.
- Crn.** Cresson, George B., Philadelphia. Son of E. T. Cresson, and also interested in Hymenoptera. All the records credited to him were made for the first edition, and his collecting was largely done in Camden and Gloucester Counties. As the material was in most cases compared with the types in the collection of the American Entomological Society, the records may be considered as reliable.
- Davis**, G. C., Pasadena, California. Mr. Davis is cited as authority for the New Jersey habitat of certain parasitic Hymenoptera, and these records come from his published papers; some of his study material having been sent in by collectors in our State.

- Dietz, Dr. William G., Hazelton, Penna. Lepidoptera, and especially the Tineoidea. Dr. Dietz has prepared the list in this super-family, and is authority not only for the general arrangement, but for many of the species that are listed. He has been good enough to determine whatever material has been sent him by New Jersey collectors, and also named not a few Tortricids and Pyralids. In the Coleoptera Dr. Dietz's papers in the Rhynchophora have been followed in the groups treated by him.
- Dkn. or Dn. Dickerson, Edgar L., Newark. Is a student at Rutgers, and has collected in Coleoptera and Lepidoptera for some years. His chief collections were made at either Chester or in the vicinity of Newark. I have seen most of his material and have determined some of it.
- Doll, Jacob, Brooklyn, N. Y. A collector and breeder of Lepidoptera who has few equals in the skill with which he prepares his specimens.
- Ds. Davis, Wm. T., Staten Island. One of the few really good general collectors. He has made it an object to thoroughly explore the fauna of Staten Island, and his material, so far as he has not felt competent to work it up himself, has been identified by specialists, so the records may be considered entirely reliable. He has also collected at Manchester, in Ocean County, Newfoundland, in Morris County, and, to a less extent, Spring Lake, Passaic County, and other localities.
- Dyar, Dr. Harrison G., Washington, D. C., in charge of the Lepidoptera in the U. S. National Museum. Dr. Dyar has made a specialty of classification based upon larval structures, and his general scheme is accepted in this publication. He has supplied many notes on food plants of Lepidoptera and has also added much to the list of saw flies among the Hymenoptera. In a few instances the facts with which his name are associated were obtained from his published papers; but as a rule they are original notes made by Dr. Dyar for this work.
- Edw. Edwards, Henry, late of New York City. Was a Lepidopterist of recognized authority and published a list of the descriptions of early stages from which some of the references to food plants are taken.
- Fernald, Dr. C. H., Amherst, Mass., Professor of Entomology at the Agricultural College. Is a special student in the *Tortricoidea Pyralidoidea*, and his published lists and revisions are made the basis for the present enumeration. Dr. Fernald has kindly looked over and determined my entire material in the super-families mentioned, and has also determined many species for other collectors.
- Fitch, Asa. Late of Albany, N. Y., and State Entomologist for many years; all records credited to him are from his published writings.
- Fox, William J., Philadelphia. Assistant Librarian in the Academy of Natural Sciences. Special student in the aculeate Hymenoptera. Mr. Fox has collected largely in Camden and Gloucester Counties, and his records in the Hymenoptera add very largely to the list. In addition, he has determined much of the material collected by others, including myself, and this has made possible the incorporation of many records that would otherwise have been unavailable. Without Mr. Fox's assistance the actual capture data in the Hymenoptera would have been scant indeed.

- Greene, Charles T., Philadelphia.** A collector of Diptera, whose records are cited by Mr. Johnson.
- Greene, George M., Philadelphia.** A collector of Coleoptera, whose records were sent me by Mr. Johnson. Dr. Calvert cites some Odonata from him, and these are credited to "G."
- H. Hornig, H., Philadelphia.** An amateur whose records in the Odonata are cited by Dr. Calvert.
- Hagen, H. A.** Late of Cambridge, Mass., and during his lifetime the leading authority in the neuropterous Orders. When cited here, the locality is from his published writings.
- Heidemann, Otto, Washington, D. C.,** collector and student in the Hemiptera-Heteroptera and especially Capsidæ. Mr. Heidemann has named a portion of my material and has revised the list in the family Capsidæ, adding considerably to the number of species and bringing the arrangement into accord with the present knowledge of the family.
- Henshaw (or Hw), Samuel.** Boston Society of Natural History, Boston, Mass. Is a Coleopterist and especially interested in the literature of the order. His check-list forms the basis for the arrangement used in this work, and names of quite a number of species recorded from New Jersey were sent me by Mr. Henshaw.
- Hess, J., Newark.** A Coleopterist who furnished many records for the first edition.
- Hn. Hamilton, Dr. John, late of Pittsburg, Pa.** Dr. Hamilton spent a short period in early September for several years, at Brigantine beach, and his collections in New Jersey were all made at that place and at that time. Dr. Hamilton was known as a thorough collector and a good student of beetles, his publications on coleopterological subjects and his faunal lists marking him as both reliable and accurate.
- Hnt.** See Huntington.
- Hopkins (sometimes Hpks.), A. D., Morgantown, West Virginia.** Makes a specialty of the Scolytids and has sent me many notes on food habits, &c. My entire collection has been looked over by Mr. Hopkins, who has also made some suggestions as to the synonymy or general relation of some species to each other.
- Horn, Dr. George H., late of Philadelphia.** Dr. Horn was the leading American Coleopterist at the time of his death, and he determined a great many species for me in the more obscure families. His collections were always open to me and practically all of my larger material has been directly compared with his specimens. Dr. Horn also named much of the material taken in New Jersey by the Philadelphia collectors, and in his material were a number of rare forms from our State. The collection is now in the possession of the American Entomological Society.
- Hulst, Dr. George H., Brooklyn, N. Y.** Is a Lepidopterist and specializes in the Geometridæ and certain families of the Pyralidoidea. Dr. Hulst was my predecessor as Entomologist to the Experiment Station, and his collection, except in the special groups studied by him, is in New Brunswick as the property of Rutgers College. Dr. Hulst has determined a

large portion of the Geometrids for the list and some of the Pyralids, and his papers in the groups revised by him are here followed.

- Huntington, William S., Philadelphia. A collector of Coleoptera and Lepidoptera, whose records were sent me by Mr. Johnson.
- Jl. Jülich, William, late of New York City. Was a Coleopterist of many years' standing, especially interested in Rhynchophora. In that series his notes were furnished for the first edition, and they have lost none of their value since. His collection is now with Mr. C. H. Roberts.
- Jn. Johnson, Charles W. Curator of the Wagner Free Institute in Philadelphia. Is a specialist in Diptera, but collects also in other orders. He has furnished useful records in nearly all, and the list of Diptera has been entirely prepared by him. This list and its editor is much indebted to him, therefore, for material aid. Mr. Johnson has collected at several points in New Jersey, but mainly, of late years, at Delaware Water Gap, on the east side of the river; at Riverton, Burlington County, and at other points readily accessible to Philadelphia.
- Joutel, Louis H. New York City. Collects generally but I have records only in the Coleoptera, mostly sent by Beutenmuller or Schæffer.
- Kp. Kemp, Stanley T., Elizabeth, formerly of Camden. Collects Lepidoptera, but has also collected Coleoptera and supplied some good records. Mr. Kemp collects micro-lepidoptera as well as the larger forms, and his material is always well dated. The determinations in the moths have been largely made by myself, and in the Micros many species have been submitted to Dr. C. H. Fernald and Dr. Wm. G. Dietz.
- Kr. Kircher, George, Jersey City Heights. A Lepidopterist and member of the Newark Society. Most of his material has been collected near his home, and nearly all of it has been looked over or determined by me.
- Lansing, Harmon, New Brunswick. An amateur, general collector who has taken some very good species at Lakewood.
- Lg. Leng, Chas. W., Staten Island. Mr. Leng is a Coleopterist and a recognized authority in the family Cerambycidae. He has added a very considerable number of species to the list from Staten Island and a few also from Newfoundland, Manchester and other parts of the State. His collecting trips have been largely in company with Mr. Wm. T. Davis, also of Staten Island.
- Li. Liebeck, Charles, Philadelphia: an excellent Coleopterist whose records in the list of beetles may be relied upon. As he is in practical charge of the arrangement of the Coleoptera in the collection of the American Entomological Society, has free access to the Horn collection for comparison and study and is himself an indefatigable collector, his records are especially valuable. His collecting has been chiefly in Camden, Gloucester and Atlantic Counties.
- Ll. Linell, Martin L., late aid in the Department of Insects, U. S. National Museum. An excellent Coleopterist, who, some years ago, collected carefully throughout Hudson County, largely in the marshes; but also along the Palisades and a little in the Orange Mountains. His determinations were carefully made and may be relied upon.

- Loeffler, Jacob, Newark. Coleopterist, from whom many records were obtained for the first edition. His material was at that time seen and partly determined by myself.
- Love, Dr. E. G., New York City. Collects generally, but chiefly Coleoptera, and in this order his records are especially useful, because of the dates of capture which accompany most of them. He has collected at a number of points in the State, but mostly along the Palisades, north and south from Fort Lee. His material has been generally determined by specialists in the various orders, hence the records are, in all groups, to be relied upon.
- Lt. Laurent, Philip, Philadelphia. Collects generally, yet chiefly Coleoptera and Lepidoptera, specializing in the latter. Mr. Laurent's records have been chiefly in the Lepidoptera, and largely in the families of micros, where his material has been named by good authority. His collections have been largely in Camden, Gloucester, Atlantic and Cape May Counties.
- N. Nell, Philip, Philadelphia. Collects generally and his records are cited by several contributors.
- Neum. Neumoegeu, Berthold, late of New York City. Was a Lepidopterist who had accumulated during his lifetime one of the largest collections in the United States. This collection is now in the Museum of the Brooklyn Institute of Arts and Sciences. Mr. Neumoegeu collected some interesting species at Morris Plains, which are recorded here.
- O. S. Osten-Sacken, Baron R. von. One of the most eminent of the earlier writers on American Diptera. Collected in New Jersey, and published records of his captures are cited by Mr. Johnson.
- Osborn, Prof. Herbert, Columbus, Ohio, State University. Specialist in the Hemiptera. Prof. Osborn has prepared the list of Homoptera in its entirety from his own notes and from notes and material supplied to him by myself and others. All of my material has been in his hands and also the material of some others of the collectors in this order. The Homoptera, therefore, represent not only all that has been actually collected in the State, but also the present classification of that order.
- Pergande, Theo., Washington, D. C., assistant in the Division of Entomology, U. S. Department of Agriculture. Mr. Pergande has very kindly looked over the manuscript of the list in the plant lice, and has made both additions and corrections. He also sent me the data for the list in *Thysanoptera* or Thrips, and the whole of that order is, except as to the arrangement, Mr. Pergande's work. I have to acknowledge general assistance in other directions from him, and it gives me pleasure to admit my indebtedness for much general information.
- Pm. Palm, Charles, New York City. An enthusiastic collector of Coleoptera and Lepidoptera who has spent much time in the region about Lake Hopatcong, with which locality his name is most generally associated in this list. Much of Mr. Palm's material has been determined by specialists, hence the records are, in most cases, reliable.

- Pr. Paulmier, Fred C., Madison, New Jersey ; graduate student at Columbia, doing special work in Entomology. Has collected Coleoptera and Hemiptera ; his records in this latter order being of especial value from the accurate dates and notes on food habits. Quite a number of the Coleoptera have been determined by myself while some of the Homoptera have been submitted to Prof. Herbert F. Osborn. Of the Heteroptera many have been determined by Prof. Uhler : hence all these records are reliable.
- Rehn, James A. G., Philadelphia. A collector of Orthoptera whose records were sent me by Mr. Johnson.
- Reineck, William R., Philadelphia, at one time much interested in Coleoptera. Many of Mr. Reineck's records came to me from Mr. Johnson, but he has also sent me a very good list of *Staphylinidæ* from specimens determined for him by Mr. E. A. Schwarz.
- R. Rhoads, Samuel N., Philadelphia. A Zoologist with a special interest in the insects, and particularly dragon flies. In 1899 he made a bicycle journey through parts of South Jersey during the latter part of the season and captured a considerable lot of Odonata, which Dr. Calvert has determined.
- Riederer, L. A collector of Dragon flies, whose records are cited by Dr. Calvert. Some of the records credited to R. belong here, the confusion having been caused because one set of records were interlined after the MSS. had been completed, the conflict being unnoticed until the form was printed.
- Riley, Dr. C. V., also C. V. R., Late of Washington, D. C. All the records are from published data and mostly to early stages or food-plants.
- Roberts, Chris H., New York City. A Coleopterist who specializes in aquatic forms, and who has collected at various points in New Jersey. The data used here were all supplied for the previous edition of the list ; but Mr. Roberts has since then given me a number of named specimens which have served as bases for comparison with material collected by myself.
- Say, Thomas. One of the fathers of American Entomology. All records credited to him are from his published writings.
- Sb. Seib, Simon, Jersey City. Lepidopterist of long standing, and has in times past bred many species making notes of dates and food plants ; all of which he has kindly placed at my disposal. I have looked over the collection of moths and have determined most of the smaller species. Mr. Seib's chief collecting grounds have been the environs of Jersey City Heights, Newark, and the Oranges.
- Sf. Schaeffer, C., New York City. Assistant to the Curator of Insects in the American Museum of Natural History, and a good Coleopterist. Mr. Schaeffer has collected in New Jersey, chiefly about Snake Hill and along the Palisades, using the sweep net perhaps more than any other collecting apparatus. He has added a number of species to the list that are not elsewhere reported.

- Sk. Skinner, Dr. Henry, Philadelphia, Editor of *Entomological News* and Curator of the American Entomological Society. Is a Lepidopterist and confines his studies mainly to the Papilionides or butterflies. His recent catalogue of this super-family has been followed, and Dr. Skinner has added many dates and localities. He collects incidentally in other orders, turning over the material to his specialist friends. South Jersey generally, but especially Cape May, is his collecting ground.
- Sm. Smith, John B. My own collections have been made throughout the State and in all orders. Jamesburg, Anglesea and Lahaway have been more systematically explored than any other points, but many of the species recorded from Lahaway are really the results of the unselfish labors of Mr. J. Turner Brakeley, who has sent me not only all the material collected by him, but also voluminous and interesting notes on their habits. It may be added that in every order except the Coleoptera and Lepidoptera all the material collected by me has been submitted to specialists for determination.
- Sp. Schaupp, Frank G., late of Brooklyn, New York. A Coleopterist of recognized standing and a specialist in the families Cicindelidæ and Carabidæ, in which he has published faunal lists. His main collecting grounds, twenty years ago, were along the base of the heights back of Hoboken and extending northwardly. Fort Lee, Clifton, Greenville and the banks of the Passaic were also explored and the records in the families named are generally reliable.
- Ss. Few-Seiss, C., Philadelphia. Specializes chiefly in Orthoptera and Hemiptera, in which he has added many records. These are of great importance because so few collectors of the orders named exist in and about the State. South Jersey and the points easily accessible from Philadelphia have been chiefly collected over by Mr. Seiss.
- Sz. Schwarz, E. A., Washington, D. C. Assistant to the Entomologist in the U. S. Department of Agriculture and Honorary Assistant in charge of the Coleoptera, in the U. S. National Museum. Mr. Schwarz is the best Coleopterist at present living in the United States. He has been good enough to look over the first edition of the list carefully and to note such errors and probable errors as occurred. In this way the old list has been cleared of such species as were probably erroneously identified. Mr. Schwarz has determined many New Jersey specimens for others as well as myself, and, notably, all the Staphylinids credited to Mr. Reinick. He has done comparatively little collecting in New Jersey, yet is sole authority of the occurrence of several good species in our State. He has been good enough to allow me to use the biological and other notes to the list of the coleopterous fauna of the District of Columbia, compiled by Mr. Ulke and himself. All the citations are marked "U" (q. v.). Finally, Mr. Schwarz has also revised the list in the Psyllidæ, and has added the notes concerning their food habits.
- Thompson, J., Staten Island, N. Y. Collects coleoptera, his records cited by Mr. Davis or Mr. Leng.

- Uhler, Dr. Philip R., Baltimore, Md. Our leading authority in *Hemiptera-Heteroptera*. The records cited are chiefly from his check list. Dr. Uhler has also determined much of the material cited by other contributors to this list. His credit is therefore greater than appears from the actual number of citations made.
- U. Ulke, Henry, Washington, D. C. The oldest living collector of Coleoptera in the United States. With Mr. E. A. Schwarz he has compiled a faunal list of Coleoptera for the District of Columbia with notes on the food and other habits of the species. These notes Mr. Schwarz was good enough to place at my service, and whatever has been used, is credited to "U." Mr. Ulke has done no collecting in New Jersey.
- U S Ag. United States Department of Agriculture, Division of Entomology. In this division an index is made of all the species complained of or sent in for information, and the locality from which the species was sent or complaint was made, is connected with the species. Dr. L. O. Howard, Entomologist to the Department, was good enough to have this index looked over for records of species sent in from New Jersey, and quite a number of useful notes were obtained in this way.
- U S N M. United States National Museum, Washington, D. C. This collection is now altogether the largest in the country, though exceeded by individual collections in almost every order. It contains much material from New Jersey from my old collection which was sold to the Museum in 1887, from the Linell collection of Coleoptera, and from the Fox collection of Hymenoptera. There is also some material from other sources, and I have looked over all the orders other than Coleoptera, Lepidoptera and Diptera, for notes as to localities or other data.
- Vand. Vanduzee, E. P., Buffalo, N. Y. Specialist in the Hemiptera, and chiefly in the Homoptera. Has determined considerable material for me; but the New Jersey records here cited are all from his published works.
- Viereck, Henry S., Philadelphia. A collector of Hymenoptera and Diptera whose records were sent me by Mr. C. W. Johnson.
- Wdt. Weidt, A. J., Newark. A Lepidopterist who is beginning to devote especial attention to the smaller species. Most of his collecting has been done in the environs of Newark and in the Orange Mountains, and all of his material has been seen by me.
- W. Wenzel, Henry W., Philadelphia. One of the best collectors of Coleoptera in the country, and possessing the best individual collection in Philadelphia. His collections have been chiefly made along the line of the Atlantic City R. R., in Camden and Gloucester Counties within easy reach of Philadelphia, and at Anglesea, Cape May County. This latter point has been a favorite as the number of species taken there will testify. He has also collected a little at Lake Hopatcong and in the Orange Mts. To Mr. Wenzel the list of Coleoptera owes its completeness more than to any one other individual, and in the families Scydmaenidae and Pselaphidae he has prepared the entire list. Incidentally he has also collected in other orders, the material gathered being generally turned over to his friends according to their specialties.

Zabriskie, Rev. J. L. Has collected generally, largely at Flatbush, Long Island, and at Nyack and other points just north of the New Jersey line. Some of his specimens are in the U. S. Nat. Mus., and these are credited to him in this list.

A few names may have been omitted, where only cited once or twice, but I think no contributor of any important record has been overlooked: none has been intentionally left out.

Illustrations.

All the blocks used in illustrating this list belong to either the State of New Jersey or to the New Jersey Agricultural College Experiment Station ; none have been made or purchased especially for this book. These cuts have been accumulated since the College Station has been established to illustrate the bulletins and reports and some of the lectures delivered before the State Board of Agriculture. Some of the blocks had been purchased before I became connected with the Station, chiefly from the late Dr. C. V. Riley, and they have been constantly added to since that time, either by purchase of electrotypes from the individuals or institutions originally publishing them, by purchase of duplicates of re-drawn figures, by re-engraving from prints or in other ways.

No records have been preserved of the immediate source of the blocks, and I desire to give credit here as nearly as possible to the original author or publisher rather than the person or institution from whom the electrotpe was directly obtained.

The following are from the Reports or Bulletins of the New Jersey College Experiment Station or from the Reports of the State Board of Agriculture : 1, 33, 36, 37, 38, 43, 44, 47, 59, 61, 62, 71, 73, 84, 87, 99, 101, 104, 105, 111, 112, 113, 114, 117, 123, 125, 138, 157a, 158, 162, 166, 190, 192, 201, 215, 216, 218, 219, 221, 226, 232, 234, 235, 239, 240, 241, 249, 260, 276, 283, 284, 285, 289, 291, 297, 310, 311, 320, 321, 322, 329.

The pioneer in the preparation of artistic and characteristic illustrations of insects in the United States was undoubtedly Dr. C. V. Riley, whose untimely death was a severe loss to economic entomology. The numerous figures in his Missouri Reports, in the American Entomologist, and those signed by him in the publications of the United States Departments of the Interior and Agriculture, mark a distinct advance in this branch of professional art. The following are duplicates of or reproductions from his Figs. : 15, 18, 19, 21, 22, 34, 35, 49, 55, 58, 64, 66, 67, 68, 70, 72, 75, 76, 77, 80, 81, 82, 83, 86, 88, 92, 96, 102, 103, 106, 107, 108, 110, 115, 120, 122, 124, 126, 128, 131, 135, 142, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 165, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 187, 188, 189, 195, 196, 197, 199, 200, 203, 204, 205, 206, 208, 214, 220, 222, 223, 227, 228, 229, 230, 245, 246, 247, 248, 252, 253, 255, 261, 262, 263, 268, 273, 274, 275, 278, 279, 298, 299, 300, 301, 302, 309, 313, 314, 323, 324.

Scarcely second in the importance of its contributions to entomological art, stands the Division of Entomology of the United States Department of Agriculture. During the incumbency of Dr. Riley as Entomologist a high grade of excellence in illustration was established and this has been more than maintained by his successor in office, Dr. L. O. Howard. The artists employed in the work have had years of experience and actual knowledge of insects and their structure ; but in addition their work is superintended and directed by the authors of the essays or reports to be illustrated. In this way exceptional accuracy of resemblance is attained and such fidelity to detail that improvement

seems difficult. The liberal policy of the department places these illustrations at the service of all reasonably entitled thereto at the mere cost of an electrotype. The following are from the publications of the department : 12, 13, 14, 31, 32, 45, 48, 50, 51, 52, 53, 54, 56, 57, 65, 85, 89, 90, 91, 97, 118, 119, 129, 132, 133, 134, 136, 137, 139, 140, 141, 155, 156, 157, 159, 167, 168, 169, 170, 171, 172, 173, 184, 185, 186, 193, 194, 202, 209, 210, 211, 212, 213, 224, 225, 231, 233, 236, 237, 238, 242, 243, 244, 250, 256, 257, 258, 264, 265, 266, 267, 270, 271, 272, 277, 280, 281, 282, 287, 288, 290, 292, 303, 304, 305, 308, 315, 316, 317, 318.

The following are from or after Packard, chiefly from his useful "Guide to the Study of Insects" : 7, 8, 9, 17, 25, 26, 28, 29, 60, 78, 109, 254, 259, 306, 307, 312, 319, 326, 327, 328.

From the publishers of the Standard (now Riverside) Natural History, were obtained, Figs. 16, 23, 24, 27, 93, 94, 95, 146.

From the New York Reports of the late Dr. J. A. Lintner, are Figs. 156, 293, 294 and 296.

From the publications of the Cornell Experiment Station, are Figs. 39, 40, 41, 42 and 286.

From the publications of the Illinois State Entomologist, Dr. S. A. Forbes, are 98, 160, 161, 163 and 164.

Of the remainder, Fig. 2 is from the Gypsy Moth Committee, of Massachusetts ; 3, 4, 5 and 6 are from the makers of the apparatus illustrated ; Fig. 10 is redrawn after Lubbock ; Figs. 11, 30 and 251 are after Figuier ; Figs. 63 and 198 are after Glover ; Fig. 69 is after Lugger, from the Minnesota Experiment Station ; Fig. 100 is from Prof. Bruner, of the Nebraska Station ; Fig. 110 is after C. L. Marlatt, from the Kansas State University publications ; Figs. 121, 130 and 217 are from Saunders "Fruit Insects" ; Fig. 127 is from "Entomological News" ; Figs. 207 and 269 are after Davis, from the Michigan Station, and Figs. 212 and 295 are after Webster, from the Ohio Experiment Station.

Index to Families and Genera.

Family names are printed in CAPITALS; generic synonyms are in *italics*. Where two pages are referred to, the generic name is duplicated in different orders.

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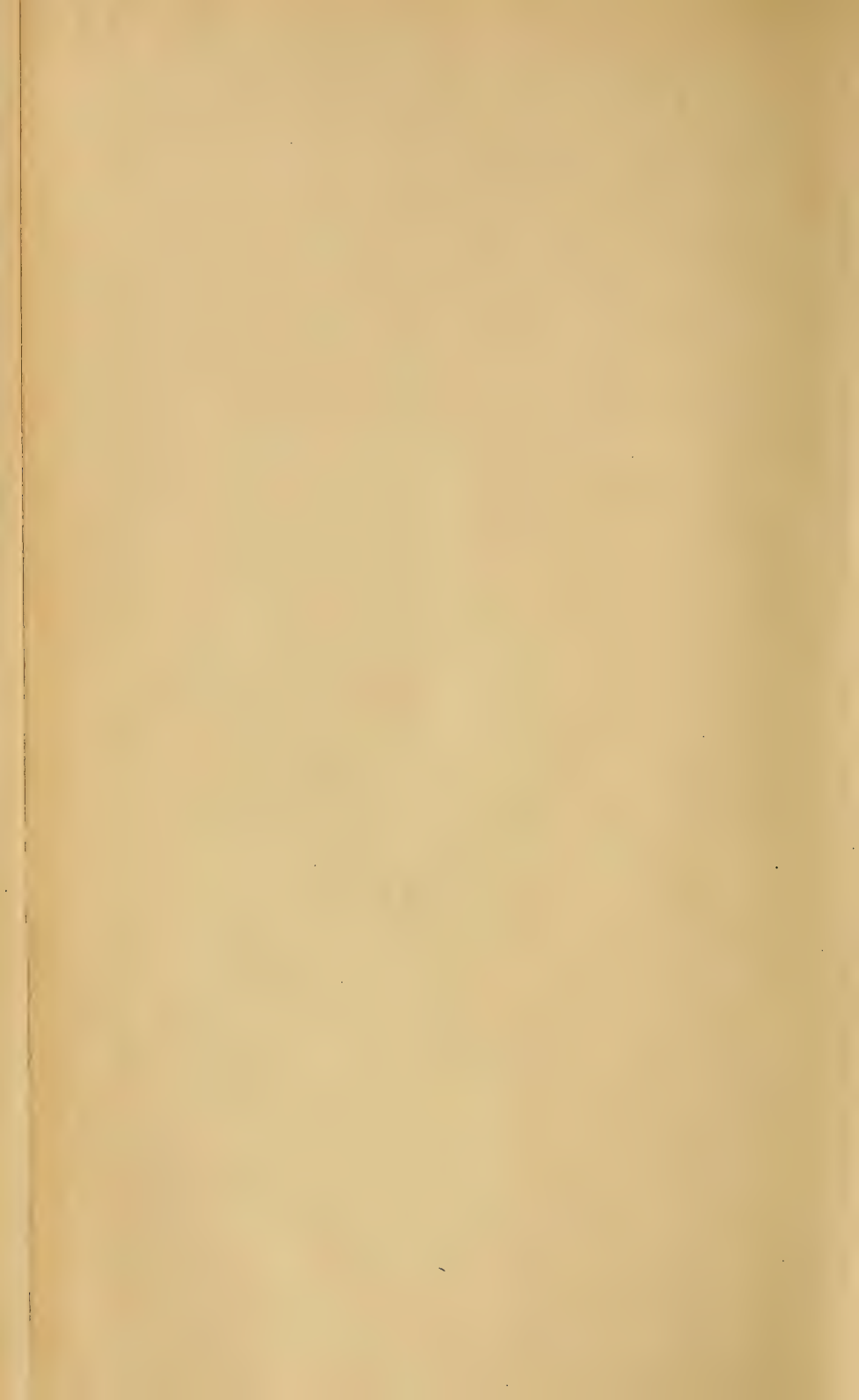
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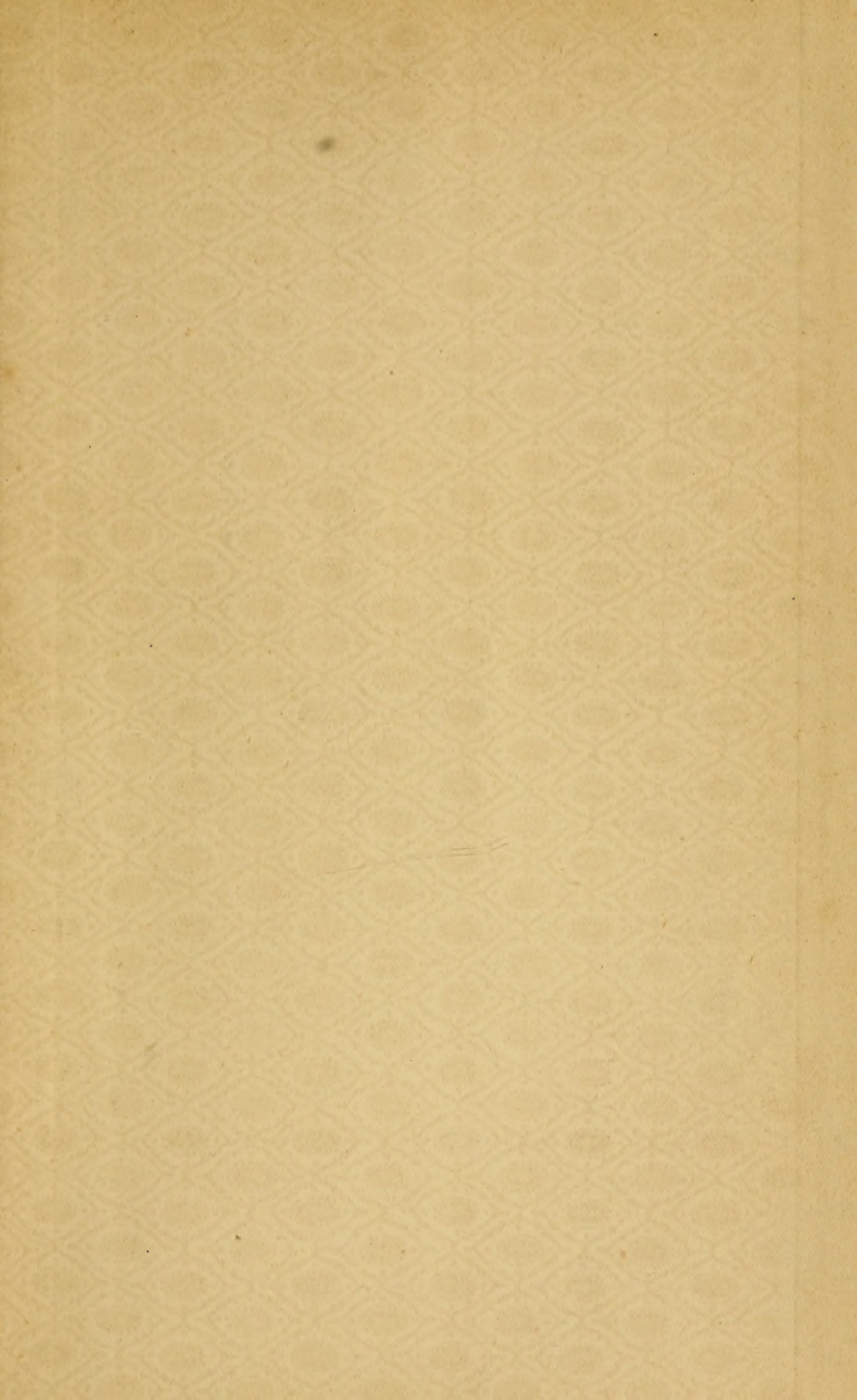


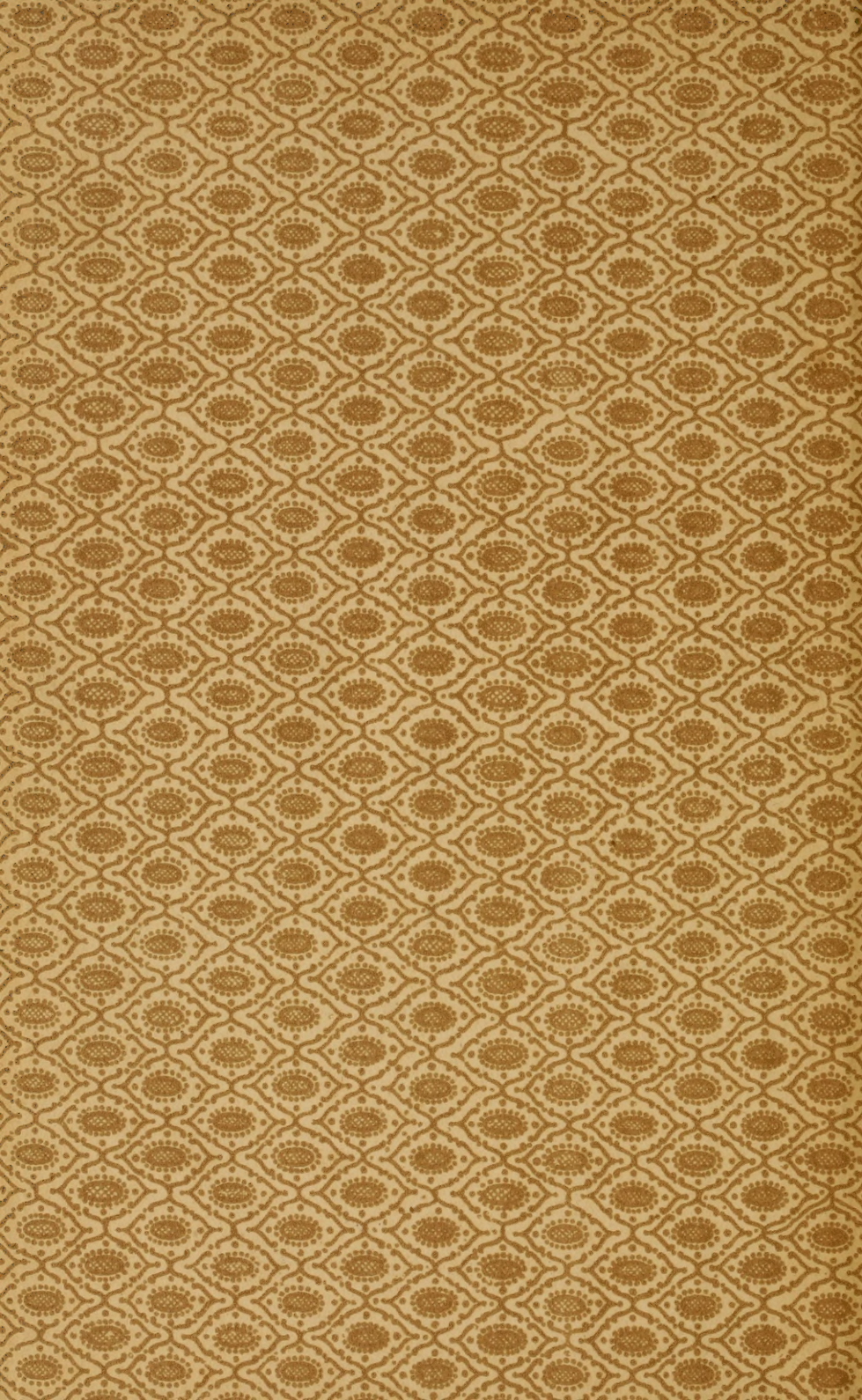


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